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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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## EDITORIAL NOTES—GAS, &c.

### Bearing of the Present Position on the Future.

THE gas industry to-day occupies a phenomenal position. The accounts that have been reaching us lately from gas undertakings—both company and municipal—show it. Gas prices were never lower than they are to-day, gas consumers never greater in number, the uses of gas never so diversified, gas stocks as a whole never higher in price, dividends never so good. Yet competition was never so rife nor keener, nor has it ever assailed the industry on so many sides as it does at present. It is for the gas industry to make the most of this current phenomenal position; for what is characterized as phenomenal to-day may be looked upon as normal or very ordinary before much time has passed over our heads. It does not take long for even the novelty of a brilliant success to wear off. The industry cannot hope to always continue to add success to success at the same rate as in the immediate past; but we can use the conditions of the present to assist in pushing forward, if not at the same rate of speed, into further success.

Before considering this point, let us remark upon one important aspect of the present conditions which offers an invincible denial to the claims of the electricians that the lower priced gas of to-day is practically entirely due to the competition of their own commodity. The hypothesis can be quickly dissipated. Had competition been the factor that had forced reductions of gas prices, these reductions would only have been made in the cause of preservation of existing conditions; whereas the reductions in price wherever they have been effected during late years—the experience has been so general that it may be taken as the rule—have invariably been followed by an increase in the girth of the business and in an enhancement of financial strength, in which both consumers and stockholders have increasingly participated. By this we do not claim the whole advancement in condition as an effect of reductions. There are likewise the internal working causes that have contributed, and contributed handsomely, to the ability to make reductions. It would be quite logical to argue that, if the electricity industry's claim were true—that it had forced reductions, and that the increasing ability of the gas industry to make them had nothing to do with the matter—then, forsooth, the present position of the latter to day would accuse the electrical industry of having been its own worst enemy. There is no running away from the fact. Never has the gas industry been more impregnable than to-day, nor stronger. Its progress certainly makes the position of every one of its competitors worse.

Generally speaking, the gas industry does not require any advice as to how to make use of the present phenomenal or unprecedented conditions. The lowering of the cost of the prime commodity to users is the best form of adding to the armour of the industry. Let us see. The more cubic feet of gas that can be purchased for a given sum, the more difficult will it be for electricity to cut into the gas industry's lighting custom to supplement their own; the more heat units that can be purchased for a given sum, the greater the chance has the gas industry of supplementing its own business in domestic and industrial heating of all kinds, and the greater the resistance that can be offered to the various competitors in the heating field; the cheaper gas can be supplied for power purposes, the better will it stand in the competition with suction and pressure gas plants, oil engines, and electric motors. Gas has many advantages of intrinsic value that cannot be offered by its competitors; but these advantages must be accompanied by a price that can alone compete in order to occupy a firm stand among the competitors. We must think of relative values in competition. The commercial value of gas for lighting in competition, may not be the commercial value of gas in competition for fuel or for power. We have therefore now to aim to work prices down to a level that will constitute a line of commercial value having application to all markets, or to a figure that can be supplemented by discounts to meet what is necessary in each line of business. This is what is being done, but perhaps not so universally as is consistent with the future welfare of gas undertakings the administrations of which are neglecting opportunity.

The gas industry is in a phenomenal position because internal conditions and expansion of business have combined to largely produce new circumstances that may be said to establish a new era for the industry. It is remarkable that benefit should have been showered upon the industry from so many directions, and yet in an extraordinary degree many of the benefits, though from different directions, are interlinked in the production of advantage. These conditions will not—we cannot expect them to—always remain unimpaired. More gas is now being obtained per ton of coal than ever before, of a calorific quality and constitution that are best for use in the appliances of the times, and which appliances in themselves have yielded to their users a wealth of efficiency, which, in its turn, has had a most important bearing upon the fabric of the industry as it at present stands. The increase in the production of gas per ton of coal has caused carbonizing wages, dividend and interest, management, and other charges per 1000 cubic feet to descend. The new carbonizing methods have brought about improvement in the qualities of coke and tar, and in the quantity of sulphate of ammonia for sale. Synchronizing with these conditions, the markets for these secondary products have all been in a flourishing position, and have shown sensible firmness. The demand for tar has grown exceedingly well for road purposes. From all over the country, good reports come regarding the vigour of the demand in this direction. One undertaking reports that the demand for tar for road purposes in the summer nearly absorbs the whole year's make. Higher prices are being asked for the tar required for these purposes than can be obtained in most cases for it from the distillers; and road authorities are now so satisfied with the economic advantages attaching to its use for road surfacing and construction, that they are willing to pay somewhat more for it. But we are with those who describe as folly the exaction of the last fraction of a penny per gallon from the road authorities, and, by so doing, are probably contributing to prejudice a growing and profitable trade. Such a course is to be condemned, especially in view of the fact that the sources of tar are not receding either in number or in capacity of output. However, these conditions in the residuals markets have had part in the building-up of the phenomenal circumstances of the gas industry at the present time, by having brought about a net cost for coal—coal that, under the new carbonizing methods, has a higher productive value than heretofore—that, in more recent years, is without parallel. This, again, has had a considerable effect on the ability of the industry to lower the price of gas.

These various tributaries to the stability of the gas industry are marked by their reciprocal tendencies; and here we almost feel tempted to enlarge upon the points how the expansion of the use of gas makes the gas industry a larger employer of labour, and a larger wage-payer than ever, and how the rates of wages and the general circumstances of labour in the industry are considerably better than in times past. The growth of the stability of the industry is the best security that its workers can have for their own future employment. This, however, only incidentally bears upon the main question. As we look round at what is being done (we cannot, of course, peer into the future sufficiently to gauge the markets), there is satisfaction with the prospect and with the opportunities that present themselves—all, if properly tended, representing the elements of increased prosperity. There is a big field, with a valuable economic bearing, in the utilization of gas as fuel in the daytime—both in summer and in winter, through cooking, water heating, room warming, and industrial uses. High-pressure gas-lamps are, where special high-pressure mains are laid in arterial

thoroughfares, playing havoc with electric arc lamps; and various gas companies are going farther in the competition with electricity by increasing their power load by supplying private installations of gas-driven generating plant for users of large quantities of electricity. But amid all this opportunity for expansion, the private consumer for lighting must not be neglected.

Taking stock of the conditions of the present, which we have termed phenomenal, and rightly so, the protection of the industry's interests, and the encouraging of its future development, it is clear, lies very largely in the direction of cheapening gas by every and any means possible within the limits of prudence. This is the best possible use—as many managements by their action (action that throughout the country has benefited consumers in recent times by hundreds of thousands of pounds) have already indicated to be their profound belief—that can be made part of the fruits of the present harvest time. "Insure the future by your present "policy" might be a useful inscription for the walls of many Board and Committee rooms to-day.

## Jubilee Meeting of the North British Association—The Reform of the Institution.

Jubilees and celebrations of past events always bid us to indulge in retrospection; and it is good occasionally, but only occasionally, to comply with the bidding. The spirit of the times, the whole atmosphere in which we live, naturally induce us to devote our main thoughts and activities to pressing forward. But if we read well into the history of the past, and have a solid understanding of the work of those who have trodden the paths before us, we find inspiration and encouragement in it all, and are better able to comprehend the needs of the present, and to move onward. In the gas industry to-day, nothing but inertia can prevent progress being made anywhere and in all directions; and by the most simple exercise in comparing the past with the present can this be proved to any mind possessing a modicum of intelligence. We will not stay to make any such comparison here. The suggestion should be sufficient for anyone who has not already done so to obtain for himself, of his own knowledge, the stimulating interest of such comparison. Thoughts run in another channel for the moment. They are directed by the fact that last week the North British Association of Gas Engineers and Managers were celebrating the Jubilee of their existence, and at the same time commencing to perpetually commemorate the work of that builder of knowledge, William Young. The latter is a matter that is dealt with in a separate article; the former—the celebration of fifty years' existence—permeated the whole proceedings. The meeting was held at Broughty Ferry. That was appropriate. Fifty years ago, in the same streets of the town, walked to its first technical meeting the men who founded the Association. Appropriate also to the occasion was the occupancy of the presidential chair by Mr. George Keillor, in whose care reposes to-day the executive responsibility for the gas supply of the town. The arrangements for the occasion were all in keeping with the spirit and idea of a jubilee; and Mr. Keillor, deftly, in his address gave just the finishing touch that forced thoughts back to the distant past, made one consider the present, and give thought to the future. The address was full of purpose; we hope the purpose will be fulfilled.

The objects of the North British Association, as of all similar organizations, have been two—to advance by united effort and conference, and the circulation of knowledge and experiences, the interests of the gas industry; and to promote the bonds of fellowship and sympathy among those pursuing similar walks in life. In both objects the Association have succeeded; in both, there is a good record. Whether the members have taken full advantage of the opportunities of their organized state, is not a matter upon which we need pass judgment here. Few Associations have done so; and no one knows it better than those constituting their membership. A jubilee is not the time for stricture for any bygone lapses, but rather a time for congratulation, jubilation, and excellent resolution. But a few reflections should have a potent influence. Mentally picture the conditions that existed in the gas industry fifty years ago. They were, looked at from the standpoint of to-day, crude and of comparatively minor importance compared with those of the present. The proportions of the industry were then relatively lean. But the conditions and the proportions were of anything but negative importance to the gas men of the time. Picture, again, those few men who were the founders of the North British Association, and who felt the need of organization some fifty years ago, and then deliberate over the question, What would those founders have thought regarding the need of organization under the conditions of to-day? If organization was then necessary, how much more so is it necessary in these times? If the objects that the Association was intended to serve fifty years ago were, by profound and mature thought, considered of such a nature as to call for organization, then surely the objects to be served to-day are comparatively manifold, and of vastly greater gravity and weight.

We trace remonstrance in the words that fell from the President last Thursday as to the apathy of the individual members in the work that lies before and around. If there is any "easy-going belief and reliance in the industry's end-"less power of self-development and improvement" without the aid of organized effort, then let that belief be dissipated. It is distinctly more dangerous to indulge in apathy and inertia when development is in unparalleled swing, and when the very fact incites the opponents, through motives of self-interest, to seriously try to arrest that development, than would be the case if other conditions prevailed. The work of our Associations must (we shall never tire of insisting upon this while the need exists) develop with the times and their circumstances. "We are sick of unreality and aweary "of shadows," said the President; and the words have application here. The President discussed the question of reform, and the putting of more endeavour and substance into the work of organization. We hope that his words have not fallen into deaf ears, but into those channels of communication with robust and intelligent minds. The industry and its conditions command that organized work shall be broadened for a fuller protection and for a continued expansion. Let the spirit and appreciation that animated and dominated the founders of the North British Association half a century since inspire the members of to-day, and interest and enthusiasm will be quickened to the common advantage. Therein will Mr. Keillor find abundant reward for the part he has taken in the jubilee year of the Association, and for the counsel running through the first part of his address.

The jubilee and reform of the Association, however, did not monopolize the attention of the President. Far from it. We have our interest sustained to the very end by the piquant and thought-arousing comment of Mr. Keillor on topics of momentous import to the present and the future of the gas industry. Many who read the address, and who have not hitherto been alive to the need of reorganizing the industry's forces, and impelling to greater activity in the causes of reform, will feel that they have been chastized by a skilled hand, and summoned in no uncertain voice to arouse themselves. The President does not in any way mince matters. He speaks courteously, and yet firmly and plainly; and there is in his remarks a warning that, if the Institution of Gas Engineers desires to regard itself as the central organization of the industry, it must mend its ways, rearrange its house, and broaden its basis. Plenty of work is at hand for such an organization to do in raising the status of the profession, and in looking after the common interests of the industry. In this connection, there is much discussable matter in the address—more than can be dealt with within the limits of an editorial article. But we urge that the deliverance be read; and the result will be many adherents to the side of those who are pressing for reformation in the constitution of the Institution, and larger and more persistent work in place of the lethargy, or little better, that now obtains.

The Committee who are considering this matter, as the result of the address that Mr. James W. Helps delivered in 1910, must see that a considerable amount of dissatisfaction abounds. And we take it that Mr. Keillor, as a municipal gas engineer, knows well the feeling that exists in this connection in municipal circles. He thrusts into broad daylight what those who have followed up this matter closely have had knowledge of for some time—that among municipal authorities, the Institution is not regarded as a representative organization for the industry. It is looked upon by them as more company than municipal. We are not with Mr. Keillor and those who think with him that the charge (if so it can be called) is warranted. The Institution knows no distinction between the one and the other. Its list of Presidents and the constitution of the Council show this. But there is no question whatever when we come to look at

the results of the appeals that have been made through the Institution, that it has not the fullest confidence of the municipalities owning gas undertakings. The same applies to a less extent among the companies. But in regard to municipalities, the Publicity Scheme has brought several important ones into closer contact with the Institution than hitherto. Here, parenthetically, it may be said we are not in agreement with the President, that the Publicity Scheme should have been postponed until the Institution had set its house in order. That event is such a problematical thing in point of time that the industry would by indefinite deferment have suffered loss of opportunity. "Procrastination "is the thief of time." Concerning, too, the question of the legality of municipal subscriptions to this and other objects, certain local authorities have shown that "where there is "a will, there is a way." But that want of confidence of which the President speaks is one of the things that has to be removed. It brooks of no delay.

We do not want to see any more schisms in the gas industry in the matter of its organization. It would be, to say the least, highly regrettable—indeed, little less than disastrous—if a Municipal Gas Association were to spring up in our midst, such as that at which Mr. Keillor hints. An organization of the kind exists in connection with the electrical industry. If such an organization came into being in the gas industry, it would further weaken the Institution as the central organization. We see much more that may be stimulating and effective in gaining the end in the suggestion of the President that, if the Institution are slow to move in reconstructing itself, and in broadening its objects in conformity with the progress and necessities of the times, the District Associations should move in forcing the Institution to get out of the old ruts, and to make itself worthy of the position that it is its ambition to occupy in the gas industry of to-day, while taking no action to qualify itself for bringing about the fulfilment of its aspirations. If in each of the District Associations some leading spirit took up the matter, we believe it would be seen that greater dissatisfaction exists with the Institution at present than some people imagine who have not the opportunity of testing the feeling on this matter throughout the length and breadth of the land. An organization is wanted that will do more than hitherto in moulding the policy of the future, and that will take part in working persistently, when occasion needs, for the reform of gas legislation, for the redressing of grievances (such as the absurd position of the question of depreciation allowance for income-tax), and for necessary changes conforming with development and progress. The President deals with some of these matters. In short, a central organization is wanted that will assist in building for the future, in ways in which undertakings are operating individually while in some of those ways a larger effect could be produced by acting collectively. It is a remarkably thoughtful address that is before us; and if the gas undertaking at Broughty Ferry cannot show "extraordinary "results," we are satisfied that its Engineer is animated by the best of progressive policies.

## In Memory.

One of the finest pieces of the large and useful work that the North British Association have accomplished during an existence of half-a-century has been the setting up of a memorial—not in wood or stone, but in a manner more in keeping with the life-work and characteristics of the genius whose name the members desire to keep green and in revered recollection—to William Young, one of the greatest sons of Scotland, and a great benefactor of the industrial life of that country. His benefactions (they were many) were scientific and economic, with a large final contribution to the substance of commercial prosperity. The memorial that the Association have set up has its base in the fund that was accumulated for the purpose; the pedestal has been furnished in the masterly appreciation that the old friend of Mr. Young—Dr. Alfred Daniell, M.A., L.L.B., D.Sc., Barrister-at-Law—has written, and which will stand for all time as the portrayal, by one who knew him intimately, and was cognizant of the thoughts and aspirations that animated him, of a man of giant intellect, who used his talents —he was incapable of resisting their use—to the material benefit of his times and generation, and of all succeeding times and their people. The lectures that will be delivered in connection with the Association from time to time, as the result of this foundation of the William Young Memorial Lectureship, will cause the successors of the present members of the Association, and many besides, to ask what manner of man was this, what was the peculiar nature of his gifts, and what was the character of his work—work that is monumental among us to-day—that the Association should have instituted this memorial to him. They will find their answer in Dr. Daniell's appreciation, which will be preserved in the "Transactions" of the organization.

We read in this work of Dr. Daniell more than is expressed. The care, the thought, the patient research that are transparent throughout are the unspoken and unwritten attestations of the honour and deep feelings of regard that the writer bears for his departed friend. It was a work of love, but a work that had always pressing on it the feeling of the impossibility of doing justice to the subject and his fruitful labours. No one can adequately penetrate and portray in words the subtle workings of such a mind as that of William Young. The psychologist might attempt, but he would inevitably fail, however close his knowledge of the man in life. There were no empty spaces in the life of William Young. The reviewer in his sketch shows it. To within a few hours of the time when his gifted and active brain ceased its questioning, its fathoming, and its working, he was thinking and analyzing the problems of the day, and presenting his thoughts and deductions to the world that they interested. Science and practice and practice and science were with him inseparable. He made the one bear upon the other. From boyhood to the end, the trifles in his work that presented problems and difficulties were never passed by until he had found the solution. That was the secret of the place which he made for himself. Science and his great mental capacity were brought to bear upon the smallest nut that seemed to defy having its shell cracked, and the kernel yielded. There was no passive surrender by him to any difficulty.

From comparatively small things, Dr. Daniell reminds us by his appreciation, the largest issues and developments of knowledge sprang into being through the dissecting hands and penetrative brain of William Young. He would not leave those problems. His alert, restless, inquiring, and inventive spirit was always hungry for new information, and continuously striving to improve the ways of doing things. His endeavour was ever to get beyond the present; to drag something fresh from the infinite unknown. Take, for example, the chapter of his work that commenced by the discovery, nearly half-a-century ago, that, in an experimental use of an intermediate paraffin oil in a meter, the gas that passed through it was robbed of some of its illuminating properties. This fact opened up to him quite "a succes-" sive range of new ideas." Most men would have simply discarded the use of the intermediate paraffin oil in a meter as unsuitable, and there left the matter. But that was not sufficient for William Young. There was the wherefore to be investigated; and we find him inquiring into the absorptive powers of various grades of oil in relation to the illuminating constituents of gas, and into the nature of the illuminating constituents of gas themselves by separating them out of the gas. To cut a long story short, he found that "the fractionated oils, from intermediate to heavy, would "extract from gases the illuminating constituents—what we "may call the gasolene products, and this to such an extent "that the ordinarily permanent gases were absorbed." The information has been of vast economic importance to the shale oil industry; and the work formed the basis of the knowledge that produced (among much else) so much relief, through the oil-washing of gas, when naphthalene troubles accompanied so largely the introduction of high temperatures into the methods of carbonization in the gas industry. This is referred to as an illustration only, of how small difficulties formed the incipient stage to new discovery through the intellect and at the hands of William Young.

We cannot enter, in this reference to Dr. Daniell's appreciation, into any mention of all the paths in which Mr. Young's quest for knowledge and improvement lead him. He made much history in connection with the chemical technology of the gas industry and shale oil industry. The epitome of it all is in the skilfully performed work before us. There is the story of the development of the Aitken and Young process of condensation in gas manufacture, or for the treatment of gas during condensation; of the work encountered in obtaining hydrocarbon vapours from gas; of that directed to the absorption of sulphur compounds from gas by the use of a gasolene condensate from waste shale gases; of his later accomplishments in connection with the

enriching of coal gas and with the Peebles oil-gas process; of his work in relation to tar fog; and of that on the purification of coal gas in closed vessels by means of ammonia. But those among us who only studied his early work as matters of the history of development, will remember him best by the live interest engendered by his later work and writings in connection with the liberation of the gas industry from the naphthalene plague (with his name in this connection that of Glover is honourably associated), and by his work in the chemical and physical problems of carbonization. How great was his compass and his perspective is found not only in the narrative but in the index of Mr. Young's contributions to technology with which Dr. Daniell presents us, and which must have entailed enormous labour.

From the glimpse afforded of the man and his labours, we have those distinguishing features that made his life work what it was brought into striking relief. His powers of observation, initiation, penetration, intuition, cultured by science and practice, had anything but the effect of introducing into his character any narrow-mindedness or self-consciousness that make some clever men intolerable among their fellows. He retained his open-mindedness to the last. His own developments taught him that the results of his work were but stages in a general progress, and that they would in time be left behind. He was content that it should be so. He was content that he had been an instrument in the making of progress. He himself, in connection with the work of the gas industry, saw much of the result of his own labour left behind by the development of the times; but he had the satisfaction of knowing that his own work formed part, and a valuable part, of the fabric that represents the gas industry of to-day. He lived a strenuous life in the interests of the gas and shale-oil industries. "His example "remains," writes Dr. Daniell; and we will add, "may the "influence be great in the industries he served."

The author of the appreciation has done his work well. It forms, as we have said, the pedestal of the memorial that the North British Association have set up. The lectures that will succeed from time to time will supply the laurels that will be placed by generations around the memorial honouring a life that was in itself monumental.

## Reputation or Advertisement.

Many an old-standing firm, with a good reputation, has been driven to the wall by clinging to the belief that its reputation and the merit of its goods are alone a sufficient ægis against all comers. They learn, and severely learn, their mistake when too late. Competition in all branches of trading was never so fierce as at present; and every trader, however remotely his business may have been established, however good his reputation, has to see to it that the world in which he trades, and in which there is competition against him, knows that he is keeping in line with the spirit of the times, and that what he has to offer gives improved, and the best, value for money. If he tells no one of these things, and only lets the information leak slowly through the uncertain and unreliable channels of private communication, he is bound to lose ground, and the more active competitors —maybe with less virtue attaching to what they have to offer—will be the gainers. There must be spirited work on the part of the old-established trader on the same publicity grounds as are adopted by the competitors, without necessarily imitating them in detail.

This is the point of the paper that Mr. W. M. Mason, of Glasgow, contributed to the proceedings of the North British Association of Gas Managers last week; and we will say at once that his communication accords entirely with our own views, without our necessarily adopting every phrase that he employed. It is quite possible that the paper will not be appreciated by all gas men and gas administrations. The truth is not always palatable. There will be many a head that the "cap" will fit that is found in the following words: "I venture to express the opinion that many of their [gas "managers'] methods, so far as the commercial side of the "business is concerned, are hopelessly out of date." We agree with this thoroughly. There are gas managers who are positively not aware, with all the efforts of the technical press and the advertising progaganda of manufacturers, of many of the new inventions that are at hand for business development and protection, and whose districts are simply testimonials to a distressing arrear in the adoption of improvement. Where this is so, how can it be expected that the people in such districts will be aware of the advances in gas utilization? Away, we say, with tradition and away with precedent, where they are not in harmony with, or are repugnant to, the commercial spirit of the times.

Mr. Mason is for full and active publicity, including the co-operative movement that has been instituted, as well as local effort. He has before him the illustration of the striking successes of the Clyde Valley Electric Supply Company—not successes obtained through superior merit, but through the persistent manner in which they compel attention to the purposes to which their product can be applied. There was presented what purported to be a reply to Mr. Mason's advocacy of modern methods of advertising and educating from Mr. J. Napier Myers, of Saltcoats. All we can say is that what Mr. Myers finds good enough for Saltcoats will not be good enough for other places. Saltcoats, it is clear to those who have the opportunity of taking a broader view, is not a suitable or fair example of the conditions of the industry generally. It would be a bad thing if experience at Saltcoats were allowed to be the foundation for the governing policy of the industry in this matter. We will not trouble to discuss Mr. Myers' so-called reply. There are certain things that have to be done—certain things it is so manifest must be done—that there can be little patience with those who are not fully alive to them. The industry has to advertise, to educate, to keep the world informed of its advances, to defend itself against the abuse and the defamation of character that arise from envy and malice. Those who think otherwise are welcome to their views, and to the result of their blindness. The majority will go forward with the times, and with the necessities of the times animating them. The day will assuredly come when those who cling to tradition and precedent will have occasion to regret their preference. Their undertakings at this very hour—let them mark this—form for the competitors the easiest assailable spots in the industry. And the competitors will find them out.

Among those present at the meeting was the President of the Institution of Gas Engineers (Mr. R. G. Shadbolt); and he made some pertinent remarks on the question of the Gas Publicity Scheme. Although not reported, it may, in the cause of circulating information that will remove a false impression, be stated that the Council of the Institution of Gas Engineers are taking special steps for the establishment of a body (apparently subsidiary to, and yet conjunctive with, the Institution) to carry on the publicity work, in order that all classes of undertaking—company and municipal, large and small—may be properly represented in the administration of the funds and the direction of the work. This should remove any feeling of grievance on the point that may have been imagined, though having no solidity or foundation in fact; it will also remove any question as to the validity of participation in the administration of the funds by others than members of the Institution. The point was also discussed as to the legality of municipal bodies contributing to funds for publicity purposes. There need be no trouble over this. Some of the larger municipal gas undertakings have determined the matter for themselves. It is a proper thing to spend money in business advertising; and the question of the agency through which the money is expended is surely one for determination by the management. The municipal electricity undertakings who contribute to the Electricity Publicity Committee are not worried about the matter, nor (so far as we have seen) is the point used as an excuse for receiving benefits from the work without subscribing to the defraying of its cost. Early in October there is to be the second Gas Publicity Conference; and we emphasize the hope of the President that there will be, by that time, a good accession of subscribers from the ranks of municipal concerns.

## Vertical Retorts for Moderate Sized Works.

The cardinal feature of the paper that Mr. W. Blair read at the meeting of the North British Association on the Glover-West system of continuous carbonization at Helensburgh, is that it brings before us an example of the application of the very latest method of coal carbonization for gas production to a moderate sized gas-works. Helensburgh to-day stands unique in Scotland, in that the whole of its gas requirements is met from the operation of the new settings of verticals. Helensburgh, too, will be able to boast henceforth that it led the way in the United Kingdom in completely committing itself to the vertical system of carbonization. We heartily congratulate the Gas Committee and Corporation of the town, as well as their Manager (Mr. Blair), upon their enterprise. Mr. Blair may be credited with knowing a good

thing in carbonization plant when he sees it. In his paper, he has claimed for Mr. John West an unequalled experience in matters appertaining to carbonization plant; and if we transfer our thoughts back a number of years, we may say that the years that Mr. Blair spent in actively taking part in executing contracts for carbonizing plant, in connection with a well-known firm of contractors, make him a competent judge of what a retort-setting should be. Now here is this installation of Glover-West continuous verticals at Helensburgh, consisting of sixteen retorts, in two beds, with a capacity of 500,000 cubic feet per twenty-four hours. But the point that will most interest managers of small or moderate sized works with a variable demand is that the arrangement of the settings is such that (each setting is constructed with a twin producer) any two retorts can be in operation at one time. So that the installation is capable of being economically worked just as requirements rule. A few years ago there was much discussion as to the lower economic limit at which power charging and discharging machinery could be applied to gas-works; and for ever since the smaller undertakings have taken it as impossible in their case for power machinery for horizontal retorts to be applied with economy to their restricted conditions. Is it to be that their salvation is to be found in succeeding developments of the vertical system? Helensburgh certainly goes far in supplying the answer.

This new installation (which supersedes the old horizontal retorts) is an extension of the works. Site, railway siding, waggon tipper, weighing-machine, and everything in connection with the installation cost about £14,700. We wish Mr. Blair had divided the costs as between the retort installation and the site and railway accessories. But the figure given is sufficient for our point, demonstrating as it does the economy that the Helensburgh gas undertaking is going to secure from this extension and piece of modernization. It is estimated that the plant will effect a saving of £1100 to £1200 a year; and that the labour costs will be some 50 per cent. below those with the displaced settings. From these figures it is patent that the plant is going to pay for itself in a measurable number of years. This point as to the economy to be produced will have considerable weight with those gas managers who have carbonizing plant to which power machinery has not been applied on account of modest productive capacity. As to the advantages claimed, and proved to exist with vertical settings, they are as material (if not on the same scale) in moderate sized installations as they are in larger ones. Regarding results, Mr. Blair's experiences will be especially interesting to those managers in Scotland who are using coal of the same class as that referred to in the paper. They are good; and in them (including the low fuel account of under 12 per cent.), we have the proof that there is no longer any necessity for gas managers of the smaller works looking upon vertical retorts as being beyond their reach.

## Another Good Report from Australia.

The report which appeared in the last issue of the "JOURNAL" showing the progress of the Metropolitan of Melbourne Gas Company is now followed by an equally encouraging account of results secured at Sydney by the Australian Gas Company. For the past half year there is an increase in consumption amounting to 11 per cent.—for which, it seems, the extensions going forward in the suburbs are largely responsible. Another satisfactory point is that the Glebe Municipal Council, who some time ago gave notice to discontinue gas lighting in the streets, have after all entered into an agreement with the Company for gas lighting with inverted burners. This further indicates that the advantages of gas for street lighting are being recognized in Australia as they are elsewhere. Proof also of the popularity of the gas-cooker is furnished. During the past six months the Company sold over 1300 stoves—making the total number disposed of to date nearly 23,000. In fact, the day consumption now equals 46 per cent. of the total sales.

## Gas for Domestic Water Heating.

Allusion was made in these columns last week to an article that had appeared in the Engineering Supplement of "The Times," by Mr. R. Herzfeld, on the question of domestic water heating. We pointed out that that gentleman had not paid sufficient attention to the subject in relation to the economies derivable by the use of gas-boilers properly fitted. Mr. Frederick Dye has supplied the deficiency in a letter to our contemporary; and, characteristic of Mr. Dye, his communication is of a practical character. Instead of paraphrasing the letter here, we give the main part *in extenso* on p. 691; and both the costs and the hints as to the safeguards connected therewith will be found very useful in the hands of the commercial men of gas undertakings. The information exhibits the fact that water heating by means of gas for domestic purposes is to-day undeniably an economical process.

## Another Co-Partnership Company.

It is always with a keen feeling of satisfaction that we record in the pages of the "JOURNAL" an addition to the ranks of those gas undertakings who have adopted the beneficent principle of co-partnership. Thus the recent half-yearly report of the Directors of the Harrow and Stanmore Gas Company proved extremely welcome; for it contained an intimation that a proposal was on foot to introduce co-partnership. The proposal, it is gratifying to note, has now become an accomplished fact; the wishes of the shareholders (as well as of the Board), as evinced at the meeting of the Company, being entirely favourable to the adoption of this course. It will be seen from the account of the meeting which is published to-day, that all the regular staff, with the exception of the Engineer and Secretary, are to be included in the benefits receivable under the scheme. The intention is to make the employees shareholders in the concern by giving ½ per cent. bonus upon ordinary salaries and wages for every penny reduction in the price of gas below the standard charge of 4s. per 1000 cubic feet. Calculated on the existing price of gas, the bonus of the present year will be at the rate of 4 per cent.; and in the accounts which were presented at the meeting a sum of £150 was reserved for the scheme. The list of co-partnership gas companies is becoming quite an extensive one; and as time goes on, it may fairly be anticipated that the number will be added to with increasing rapidity, as the advantages of the principle become more and more widely recognized. To secure what practice has proved is obtainable by the adoption of the co-partnership system, is surely worth all, and much more than all, the monetary outlay that it entails. Though the Harrow employees commence with the comfortable bonus of 4 per cent. on their salaries and wages, a study of the Company's affairs leads to the conclusion that this is by no means likely to prove a maximum figure in the future. The business is a continually increasing one; and for the first half of the present year an expansion is recorded in the quantity of gas sold, as compared with the corresponding period of 1910, of no less than 15½ per cent. Railway stations are, it is learnt, still being opened, and new districts developed. Economies, also, are being looked forward to which should soon further reduce the capital expenditure per ton of coal carbonized. All of which considerations would seem to hold out promise in times to come of additional concessions to consumers in the matter of the price of gas. One of the features of the half-year's working of the undertaking, it may be remarked, is the unaccounted-for gas, which is down to the satisfactory figure of 2¼ per cent.

## Insurance Against Strikes.

A proposal for mutual insurance against strike losses has been advanced by Mr. Alexander Wilson, of Liverpool, in the columns of "The Times;" and in reply to criticisms made upon his suggestions, he addressed a further letter to that paper, which was published some days ago. Though the criticisms were directed more to the practicability than to the desirability of insurance, both points are dealt with by him in the course of his answer. As to the desirability, his argument is that the risk employers have to face is not that of a universal strike, but of sectional strikes, involving stoppage of works and industries far beyond the immediate range of the actual dispute. Further, he believes that the experience of federating different trades as against strikes in that trade, has been far from satisfactory. The underlying essential of insurance is the spreading of risks; and this cannot be effectively done in one trade or in one district. The main advantage of insurance is that it would supply a substitute for the weapon which the Trade Disputes Act has thrown away—namely, a means of exercising real pressure upon workmen to abide by their agreements. Mutual insurance would mean that an employer would be placed in such a position that he could not be coerced by his workmen acting in defiance of their bargains.

The workmen would be well aware of this. They would appreciate the fact that such a strike would mean no loss to their employer, and only loss of employment to themselves. On the second point—that of the practicability of mutual insurance—Mr. Wilson quotes figures from which he arrives at the conclusion that a total premium income equal to ½ per cent. of the yearly wages bill would be equal to the loss of wages caused by strikes in trades where insurance might be beneficial. While admitting that the measure of loss to the employer might be different from the loss of wages to the workmen, he argues that the two things are to an extent comparable. Of course, concludes Mr. Wilson, each trade differs in its risks; and experience has shown that some trades—such as coal mining—are more liable to strikes than others. But if the average of all trades is a rate equal to (say) ½ per cent. of the wages bill, he thinks it is fair to say the risk is one capable of insurance, and at rates which should be by no means prohibitive.

### The Government Laboratory.

There seem to be no limits to the variety of the problems that are placed for decision in the hands of the Government Laboratory—though the business is officially classified under only three heads. That is, work in connection with the Board of Customs and Excise; work in connection with other Government Departments; and work in connection with the administration of the Food and Drugs Act, and the Fertilizers and Feeding Stuffs Act. The report of the Principal Chemist (Mr. James J. Dobbie) for the year to March 31 last furnishes much information as to the work accomplished in that period; and by glancing at the document, the wide extent of the ground covered by the operations can be to some extent appreciated. During the year the total number of analyses and examinations made in the two branches of the Government Laboratory in London was 186,044; while including the samples examined at the numerous provincial testing and chemical stations, the total number of analyses and examinations for the twelve months was 349,277. Work in connection with the Board of Customs and Excise, of course, occupies a considerable proportion of the time of the chemists; but it is largely of a standard character. It is in connection with the "other Government Departments" that unusual points more often arise. Here we see that the question of the deleterious effects of motor-oil on plant life was raised in connection with the use of scrapings taken from roads traversed by motor omnibuses—it having been stated that plants failed to grow in soil with which the scrapings had been mixed. In the sample of scrapings examined, however, no harmful ingredient was found. Then suspicion having been cast upon the genuineness of a portion of a document 300 years old, the Record Office sought the aid of the Laboratory, whose report was to the effect that there was no evidence of tampering. The words "gas-works," too, are noticed. Some dead trout having been found in a brook under circumstances which it was thought pointed to the fish having been killed by drainage from gas-works, four of the fish were forwarded for examination, and also samples of the brook water above and below what was believed to be the point of contamination. Examination of the dead fish showed that the gills were of abnormal appearance; but apart from the state of the gills, there was no chemical evidence of the presence of any substance likely to have caused the death of the fish. On analysis of the samples of water, however, the condition of the gills was fully accounted for. It appeared it was not tarry matter that had passed into the water, but an "ammonia distillate;" and the proportion of free ammonia in the stream above and below the point of contamination fully established the cause of complaint.

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Plant for the manufacture of gas for lighting and industrial purposes is about to be erected in Barranquilla, the most important port in Colombia, say "Engineer." Over 80 per cent. of all imports entering the Republic come *via* Barranquilla, which is a city of considerably over 100,000 inhabitants. The contract for the business has been granted by the Municipality of the Port to Senor Jorge Moya Vasquez.

The members of the Scottish Junior Gas Association (Western District) are to visit the Scottish National Exhibition next Saturday. Arrangements have been made for them to see the four different systems of high-pressure lighting in the Exhibition; and the two different types of compressor will be opened up for their benefit. The contrast between the gas and electric lighting of the concert hall will be shown during the evening. After seeing the different exhibits, the party will be entertained at tea by Messrs. James Milne and Son.

## GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 700.)

Markets on the Stock Exchange had but a poor time last week. There was something of a rally in the middle period, but circumstances were too strong for it, and it could not live. At the close, all the bloom, such as it had been, was off the markets, and the prospect was far from encouraging. International relations in regard to the Morocco question, and our own domestic troubles, were the dominant debilitating factors. The opening was not promising; being under the influence of some pressure to sell, and prices gave way accordingly. Government issues were heavy, Consols fell ¼, and Home Rails, though not uniformly lower, were not strong. Both the Foreign and American Markets were weak. Business was very quiet on Tuesday, but less depressed—on what ground it was not quite clear, beyond the reflection of brightness on Continental bourses. However, all departments mended somewhat, though Consols had first touched $77\frac{5}{16}$. Wednesday was more active, and was cheerful under foreign buying influence. Consols rose ⅛; and buyers were attracted to Rails by cheap prices. But on Thursday there was no support, and prices dropped down again. On Friday, the markets had lost all show of robustness. Consols and other Government issues gave way. Railways were quite weak, and the rest followed suit. This state of things continued on Saturday; and the close was quite weak. Consols were $77\frac{1}{2}$-$\frac{3}{4}$—a loss of ⅛ in the week. The Money Market was at first firm, but relaxed later on and closed easy. Business in the Gas Market was on a very good scale for the time of year, and, though there were but few changes in quotation, the general tendency was quite firm. In Gaslight and Coke issues, the ordinary was active and very steady; all transactions being within the limits of $106\frac{1}{4}$ and 107. There was not much doing in the secured issues. The maximum was done at $83\frac{3}{4}$ and $84\frac{1}{2}$, the preference at from $101\frac{1}{4}$ to $101\frac{3}{4}$, and the debenture at 80 and $80\frac{1}{4}$. South Metropolitan was marked at $116\frac{1}{2}$ to $117\frac{1}{2}$—the quotation being put down ½. In Commercials, the 4 per cent. stock changed hands at $111\frac{3}{4}$ to 113, and the 3½ per cent. at $106\frac{3}{4}$. Among the Suburban and Provincial group, Bournemouth "B" was done at $16\frac{1}{2}$, Brighton and Hove ordinary at 157, British at 46 to $46\frac{1}{2}$ (a rise of 1), Brentford new at 199 and $200\frac{1}{2}$, Ilford "B" at $124\frac{1}{2}$ and 125 (a rise of 1), Tottenham "A" at $145\frac{3}{4}$ (a rise of 1), and Wandsworth at $144\frac{1}{2}$. Two odd lots of Newcastle fetched 104 on the local exchange. In the Continental companies, Imperial made from 182 to 183, Union preference 135, and European $19\frac{3}{8}$. Among the undertakings of the remoter world, Bombay marked $6\frac{1}{2}$ and $6\frac{5}{8}$, Monte Video $12\frac{13}{16}$ and 13, Oriental $138\frac{1}{2}$, Primitiva $7\frac{7}{16}$ and $7\frac{13}{32}$, and ditto preference $5\frac{1}{4}$ and $5\frac{3}{8}$.

## ELECTRICITY SUPPLY MEMORANDA.

**Varied Municipal Experiences in 1910-11—Deficits and Recessions—Bootle's Baby—Private Consumers and Metallic Filament Lamps—The Cost of the Unit—The Mystery of a Fire.**

Week by week, in most leisurely fashion, the annual accounts of municipal electricity undertakings reach our electrical contemporaries, and the main features are published. Those that have seen the light of day this year disclose, as usual, a varied experience in financial result. There are those undertakings in choice areas that have done well; there are others that have made progress; there are others again that have managed (by what amount of squeezing here and trimming there we do not know) to show a slender amount of net profit; there are others that have had a set-back; while there is still a goodly number confessing deficits. Local conditions appear to affect the results of the operations in some areas more in the case of electricity supply than in that of gas supply; for during the past twelve months the gas industry enjoyed general and brilliant prosperity. In some districts, it is seen that the consumption of electricity for private lighting has increased, compared with the previous year; but in most cases the increase does not by a long way bring the revenue back to the sum derived a few years since from private lighting. The causes, of course, are the metallic filament lamp, and the still greater economy and efficiency effected in gas lighting through the improvements of the past few years. We were recently showing the losses of the Westminster Electric Supply Corporation through the metallic filament lamp (see *ante*, p. 284); and now from Bristol we learn that the revenue from private lighting during the past four years has been as follows: 1907-8, £47,447; 1908-9, £43,416; 1909-10, £40,779; 1910-11, £41,543. Though some undertakings may have stopped in their downward course in private lighting revenue production, for the majority of them there is much to be done to retrieve the income from this source that ruled in pre-metallic lamp days.

Increases in business are shown mainly under the heading of power and heating supplies; but we do wish electricity purveyors would separate the two items, power and heating. The only justification they can find for mixing up business in industrial power and domestic heating is that the prices are somewhat on the same level; the necessity for this being a commercial one. The gas industry, as a rule, supply gas for heating at the same price as for lighting; and they do a large and enlarging lucrative

business, while the electrical industry finds it necessary to run down to power prices to get a comparatively few people to adopt electric heating. It would be very instructive to have separately the figures representing consumption and revenue for power and for heating.

Several excellently circumstanced undertakings, as previously remarked, made surplus profits, some considerable ones, during the year; but others, and not a few, produced deficits. Here are examples: Barnstaple, £547; Beckenham, £1093; Bristol, £768 (this was after appropriating £3000 odd for renewals); Farnworth, £376; Hastings, £2919 (total deficiency to March last, £15,638); Heywood, £652 (excluding loss on tramways); Kingston-on-Thames, £1193; Kirkcaldy, £84; Loughborough, £462; Maidstone, £158; Morley, £530; Redditch, by means of a "grant" of £3000 from the rates, carry forward a sum of £1235 (this is a singular way of conducting a municipal trading undertaking); Stalybridge, &c., Tramways and Electricity Board had a shortage of £5 on the Electricity Department, and £5938 on the tramways; Wakefield, £213; and Worcester, £760, but in this case some £900 expenditure was incurred out of revenue in connection with street lighting. As remarked, these are only examples of undertakings making actual loss; there are no doubt many more. A number of undertakings have made small—very small certain of them—balances of net profits; but the information does not go so far as to show us whether these undertakings have anything in the nature of reserves. Some of them, we are afraid, stand a very poor chance of climbing out of the state of inveterate financial depression. Several concerns exhibit recessions in the balance of net profits. The surplus net revenue of Brighton has fallen from £6254 to £4751; but last year £1000 was paid in settlement of the claims of Mr. Arthur Wright, who has retired from the position of Consulting Engineer. Blackburn has had a set-back in its surplus from £1388 to £697; Blackpool, from £6266 to £5270; Crewe, from £1478 to £1268; and Oldham, from £2203 to £1300. These again must only be taken as illustrative; there may be many other instances that have not come under notice. The Epsom undertaking has had an increase in consumption "due largely to the opening of cinematograph theatres." The concern has therefore not been cutting huge slices off the business of the Gas Company.

The Bootle electricity supply undertaking seems to have been hanging about at the entrances to progressive paths without really venturing upon them. That is what we gather from a report that the Borough Electrical Engineer has made to his Committee. It only requires enterprise, and all will be well with the undertaking. Mr. Clothier, the technical chief in question, seems to be a very sanguine and optimistic man; and he does not give his competitors any credit for being in the position to bar his way, if only his Committee will give him power to make a big forward movement. Why at the present time, he tells us, the electric motor connections aggregate 2533-horse power; but there are users of upwards of 9000-horse power being served by steam and gas engines. We can vision Mr. Clothier waiting at the entrance of his generating station to welcome all the latter. He tells his Committee that most or all of these "may change their present arrangements when their plants get older." They would not wait for this, so anxious are they all for the electric drive, if the prices for electricity were at a lower figure—in other words, "the change would take place sooner if electricity were supplied at a lower price." The reduced rates for power would also encourage people to look out for sites for building factories in Bootle. There would be no place then like Bootle for factories. It is wonderful the Committee should hesitate. We see, too, that an experimental lamp replacement scheme is being tried; but that it is yet too early to judge regarding the direct financial effects. We should like Mr. Clothier to acquaint us with the terms of this scheme, in order to see how it compares with the maintenance schemes of gas undertakings. One effect of the scheme has been "to induce *several* customers to *continue*, extend, or *resume* the electric light where *otherwise they would not have done* so." Surely Mr. Clothier is trying to deceive us! Why the teaching of electrical literature is that once electricity is adopted, on account of the mythical savings in lighting and doctor's bills, the improvement of the air of rooms, the prolongation of life, and the saving of decorations and furniture, it is never again given up. Of course, gas undertakings in the course of their replacement experiences, know the other side of the story. Here in Bootle there are "several" consumers who would have discontinued, or who would have refused to resume, electric lighting, with all its electrically drawn economic and preservative attributes, unless such a comparatively paltry thing as a lamp replacement scheme had been devised. However, there is the admission. Evidently, Mr. Clothier is not altogether sure of the financial result of the scheme, as he declines to hazard even an opinion as to how it will work out. Then our friend states that little progress has been made in Bootle in the use of electricity for heating, cooking, and general domestic purposes, "though in other supply areas the use of electric energy for these purposes is rapidly increasing." Is Mr. Clothier thinking of those seventeen electric cookers that Mr. Seabrook reports have been installed in Marylebone? We will not press the point? But, touching the same matter, it is his view that a reduction of price per unit would boost-up things in this direction. There will be interest in watching the effect of the new diet that Mr. Clothier has prescribed for Bootle's municipal baby.

The metallic filament lamp, we learn from a recent issue of the "Electrical Times," is not having all its own way among private users of current. Although the lamp has, in one form or another, been with us for upwards of six years, "there is still much work to be done in the way of removing prejudice and misconception. The trouble, as seen electrically, seems to be that many private consumers will not scrap their carbon filament lamps for the more expensive ones; and they cannot be persuaded to see that the turning out of lamps throughout a house that cost 9d. or so apiece, and putting in their places lamps that cost three, four, or more times as much, is a good investment. One or two of the metallic variety put in on trial do not make a sufficient impression on the quarterly account for current to satisfy the private consumer as to the claims. But there is another reason. The writer knows of more than one case where trial metallic filament lamps have been fitted in rooms commonly used in a household; and the glare of the light and the aching eyes, after a spell of reading or writing, have resulted in a return to the less offensive carbon filament lamp. We remember Mr. A. P. Trotter, Electrical Adviser to the Board of Trade, not long since confessing that over his office desk, despite the extravagance, he prefers the carbon filament lamp, entertaining as he does some sympathy for, and interest in the preservation of, his eyesight. The latest forms of incandescent gas-burner are far less offensive in this regard than any type of electric incandescent burner.

What is "actual cost" for electricity? Does it embrace everything, including capital charges and depreciation. The question is asked because Alderman Vorley, at a recent meeting of the Islington Borough Council, quoted certain figures which he said were below cost. The charge for public lighting, he remarked, was now 1·67d. per unit; the average for all London was 1·63d.; while outside London, it was 2·05d. "The price quoted was slightly below cost." Then he went on to say the Committee had at one time overcharged for public lighting. While, however, the Council had paid the Committee £18,000 more than cost price, the Committee had also supplied the Council with electricity under cost to the amount of £12,000; so that through the public lighting, in fifteen years, the Council had paid a sum of £6000 above the actual cost, without reckoning the charge for depreciation. We suppose Alderman Vorley understands what he is talking about. If so, then his statement is presented for what it is worth. We know of some municipal undertakings that are supplying current to metallic filament lamps at 1d. and less per unit for street lighting, in order to compete with inverted gas-burners. The charge of 1·67d. per unit, Alderman Vorley says, is below cost price; and therefore what the worthy Alderman would say to a charge of a fraction of a penny per unit, we do not know. The average cost of the units of electricity generated at Islington during the year covered by the last returns of the London County Council is 2·4d., including 1·15d. for total capital expenses and 0·08d. for rates and taxes.

Can anyone assist the Wesleyan Methodists of Leeds to solve the mystery of a fire that occurred yesterday week, about half-past one in the afternoon, in their beautiful historic place of worship known as the Oxford Place Chapel? The total damage is calculated at between £3000 and £4000—among the damage being the destruction of the organ, the beautiful rostrum, part of the ceiling, and a number of pews. The chapel was closed; and how the fire broke out is described as a "mystery." The fire cannot be put down to the heating apparatus, as Old Sol has lately rendered unnecessary the use of that adjunct to the sacred edifice. One local paper says that it is generally supposed that the fire originated "at the electric switchboard near the organ." Another local paper says that some people "suspect the fusing of an electric wire near the organ." It will be noticed that the papers are cautious, and do not definitely attribute the fire to an electrical cause. They will consequently escape castigation from our electrical contemporaries. But the direction in which suspicion rests is clear; and, under all the circumstances, the suspicion appears to have a fairly substantial foundation. But the origin of the fire is referred to as a mystery, which the worshippers at the chapel would like cleared up.

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The current number of the "Transactions" of the Junior Institution of Engineers contains an article by Mr. Samuel Cutler, jun., Assoc.M.Inst.C.E. (Past Chairman), entitled "Across the Alps by Motor." The interest of the contribution is enhanced by the inclusion of a large number of excellently reproduced photographs.

London is to have a Permanent Exhibition of Patents, which it is anticipated by the promoters will fulfil a long-felt want. The exhibition will be situated in a central position, and will be open to the public all the year round. There will be no charge for admission. The object is to establish a centre where inventors may display their patents for the purpose of attracting the attention of possible purchasers. Visitors will be received at the exhibition from all parts of the world, and conducted through the various sections by expert demonstrators, who will not only be able to point out the merits of each patent, but will be able to quote for any country in the world for same. The exhibition has, it is said, already received a considerable amount of support from important firms; and when it opens there should be a noteworthy display of great variety. Further particulars are contained in a prospectus which is being issued at the present time, and which may be had free on application to the Administration Office, No. 165, Fleet Street, E.C.

## PERSONAL.

The Wells Urban District Council have appointed Mr. G. A. LUSTED, of South Godstone, as the Working Manager of their gas undertaking.

At a meeting of the Salford Town Council on Wednesday last, a graceful tribute was paid to the Mayor, Alderman PHILLIPS, who is also Chairman of the Gas Committee, for the part he played in the recent labour troubles; and the event was all the more notable from the fact that the matter was introduced by Councillor Purcell, a Labour member, and an outspoken critic of the Mayor and other members of the Gas Committee. Mr. Purcell, before the ordinary business of the Council was entered upon, said that he wished, on behalf of the Trade Unions of the borough, to express their best thanks to the Mayor for his work in regard to the labour disputes, which had, so far as they were concerned, been brought to a successful issue. He (Mr. Purcell) was frequently compelled to be in a position of hostility to the Mayor in many matters; but he felt he was bound on this occasion to thank him for his work in bringing the disputes to a satisfactory settlement. Alderman Worsley, in supporting, said he was sure everybody would acquiesce in the sentiments expressed by Mr. Purcell. They all owed a debt of gratitude to the Mayor for the arduous duty he had performed and the successful settlements he had brought about. In his response, Alderman Phillips said he had only endeavoured to discharge his duty to the best of his ability.

## OBITUARY.

### SAMUEL WESTALL DURKIN.

Unhappily, Mr. Samuel W. Durkin, of Southampton, has not lived long to enjoy his retirement. Less than three months ago he relinquished the position of Resident Engineer and Manager of the Southampton Gaslight and Coke Company; and last Wednesday news was received of his sudden death at Eastbourne, to which place he had gone a few days previously to spend a holiday. Deceased was for 59 years connected with the Company; and was, of course, well known in Southampton, where his death is deeply regretted—as it will also be by his numerous friends in the gas profession.

Mr. Durkin, who was a native of Southampton, had been associated with gas manufacture since 1852, when he became the pupil of the late Mr. James Sharp, then Engineer of the Company, who was well known as a pioneer in gas cookery. Five years later, Mr. Durkin became Assistant-Engineer; and on the retirement of Mr. Sharp, in 1867, he was appointed Resident Engineer and Manager. In the 59 years of his service, Mr. Durkin, of course, saw many changes in connection with gas supply; and he assisted in great local developments. In 1852, the annual output of the Company was 34 million cubic feet; last year, the figure was 750 million cubic feet; while the whole of the extensive works of the Company were built or rebuilt during his period of office. In 1852, the largest gasholder was one of 60,000 feet capacity. To-day there are five, ranging in capacity from 250,000 to 2,000,000 cubic feet. The high esteem in which Mr. Durkin was held was manifested on his retirement in June last, when he was the recipient of handsome gifts from the staff of the Company.

It will be remembered that in 1902 Mr. Durkin was elected President of the Incorporated Gas Institute; and he was twice President of the South-West of England Association of Gas Managers, which is now merged in the Southern District Association. He was for many years a member of the Southampton Chamber of Commerce—having been elected a Director as long ago as 1889. Prior to becoming a pupil under Mr. Sharp, it may be mentioned that Mr. Durkin was with his brother, who was at the time Manager of the Croydon Gas Company. His successor as Manager at Southampton was his son, Mr. Frank Durkin, who had for many years filled the position of Assistant-Engineer.

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Dr. J. F. ARMSTRONG, who died last Tuesday, in his seventieth year, was Chairman of the South Shields Gas Company, as well as Vice-Chairman of the Sunderland and South Shields Water Company. He had been a Borough Magistrate in South Shields since 1880; and for a long period was Senior Honorary Surgeon to the Ingham Infirmary, of which institution he was one of the founders.

The death occurred last week of Mr. H. LEICESTER GREVILLE, F.I.C., F.C.S. In early years, he was a pupil of the late Mr. Keates, Chemist to the old Metropolitan Board of Works, and in due time became his assistant, and then principal assistant. While thus acting, he accepted the position of Chemist to the Commercial Gas Company, of London, which he occupied for a long period, retiring only a few years ago. He was a clever man, and in his particular line as a gas-works chemist established a reputation almost unequalled, both by his industry and writings on technical subjects and answers to correspondents. A number of his original communications have appeared in the pages of the "JOURNAL," extending over a long period; and others have been published in pamphlet form. On his retirement, he continued his profession in a private consultative capacity, settling at Bromley, Kent. After the death of his wife (to whom he was deeply attached), his health gave way; and he died of cancer, aged 62.

## TRADES UNION CONGRESS.

### Meeting in Newcastle.

THERE was some increase in the number of delegates to this year's Trades Union Congress, as compared with those present at the Sheffield gathering twelve months ago; and the number of members represented was also greater. The gathering last week—which was the forty-fourth of the series—took place at Newcastle-on-Tyne; and, to be precise, there were 521 delegates in attendance, with an aggregate representation of 1,662,133 members, distributed among 200 affiliated Unions. These delegates included 23 Members of Parliament, more than one-half of whom belonged to the Miners' Federation; and there were between 80 and 90 who serve in a public capacity as magistrates, aldermen, or councillors. The largest individual group of workers represented were the miners of the country, who had 132 delegates, in the interests of an aggregate membership of 553,513. The President of the Congress was Mr. W. Mullin, J.P.; while it is stated that the Home Office was represented by Mr. D. J. Shackleton, the new Labour Adviser, and the Labour Department of the Board of Trade by Messrs. I. H. Mitchell and D. C. Cummings. Owing to the death of Mr. W. C. Steadman, it became necessary to appoint a new General Secretary; and the position—to which is attached a salary of £300 a year—fell to Mr. C. W. Bowerman, M.P., who was the only candidate nominated.

Some routine business having been transacted at the opening sitting on the Monday, the President proceeded to deliver his address. There was, of course, no lack of material on which to base his remarks; and a good many subjects were dealt with. Among the opening points was one of general interest: "Your Parliamentary Committee received an official invitation to send two representatives to be present at the Coronation of King George V. and Queen Mary. This is the first time in history that the Trade Union movement has been so honoured; and your Parliamentary Committee decided to accept the invitation." Dealing with the Insurance Bill, the opinion was expressed that certain features called for careful deliberation; but it was admitted that the measure, when brought into practical operation, would make great changes in the industrial conditions as they were known to-day. The fact that a weekly contribution would be required, would cause even the most indifferent to take greater interest in the working of the Act. To the statement that they, as a Trade Union body, naturally looked with satisfaction on the removal, by the passing of the Parliamentary Bill, of a perpetual bar to the declared will of the people, the President added what sounds like a threat: "It behoves those in authority to take heed of the lesson, lest they, too, in turn, fall by the wayside." Referring to the Coal Mines Bill, Mr. Mullin said that this had been beaten into shape in the Grand Committee, and, it seemed to him, more hammered than was necessary so far as the safety of the miners was concerned. But for the strength of the miners' representation in Parliament, it almost looked as if a great deal of the sympathy aroused by the recent disastrous colliery explosions would have been forgotten in the anxiety of the owners to preserve profits. As it was, the Bill promised to be a considerable improvement upon the present Act, more especially from the point of view of a more efficient inspection. It was a sad commentary, but one, he was afraid, with a good deal of truth in it, that until more experience was gained—heaven save the mark, for it meant further loss of life!—on the question of ventilation, coal dust, and electricity in mines, the pecuniary interests of colliery proprietors were not likely to be further disturbed. When would legislators make the life of the individual the first, and the profit and loss account the second, consideration? Some remarks followed on the subject of the recent railway trouble; and these, as may be imagined when the nature of the gathering at which they were made is considered, were anything but flattering to the railway directors and to the Government in thinking "more of sending troops without any applications from the civil authorities all over the country, instead of sharply laying down the law to these commercial magnates." As to the refusal of the companies to officially recognize the Unions, he asked whether there was any trade outside a self-centred railway company that had not found it of inestimable advantage to meet chosen representatives of Labour face to face, instead of workmen who had to go back to their duties. "Nobody knowing what it means," said the President, "enters upon a strike lightly; but just as certainly no Trade Unionist can think of giving up the right to leave work if he believes there is a just call to do so. Of late years the policy as to wages and working conditions has been in favour of mutual agreements, boards of conciliation, and the like. It can hardly be said that they have altogether commended themselves in actual working to organized labour. A drawn-out arbitration agony to men not receiving a living wage, or to others speeded-up to the point of collapse, has its limits."

At the conclusion of the address, various non-contentious resolutions, of which there is no need to take note here, were passed; and the first day's proceedings were brought to a close. Before the commencement of the business on Tuesday, the Lord Mayor (Sir William Stephenson) extended to the delegates a hearty welcome, on behalf of the Corporation and the people of Newcastle. In the course of his speech, Sir William expressed the hope that there would result from the present Congress a practical suggestion in the direction of the prevention of such serious

dislocations of the business of the country as they had recently witnessed, and that there would not be wanting on the part of the employers, as well as the employed, a disposition to deal with the question in a manner satisfactory to the nation as a whole. The virtue of patriotism, he added, should not be lost sight of by either party. In dealing with these matters, he trusted patriotism would come well to the front; for it undoubtedly had a great bearing upon national prosperity. It was not long after the Congress had settled down to work, that the harmony which had so far characterized the meeting was broken. Numerous delegates complained forcibly of the presence, by invitation, of the representatives of the Home Office and the Board of Trade; but a motion condemning the Parliamentary Committee for having issued the invitations was lost by a large majority, A resolution protesting against the use of the military in recent trade disputes met, however, with a better fate.

The remaining business of the morning session was the consideration of the report of the Parliamentary Committee, which dealt with numerous matters of interest to the members. It was stated that considerable interest had been shown throughout the country in the National Insurance Bill. Probably few measures had been more generally welcomed, and at the same time more strongly and closely criticized, than this particular Bill; but, given the desire, there seemed to be no reason why it should not be made thoroughly acceptable. The question of making Trade Union combinations permanent in their character had occupied the earnest attention of the Committee; and it seemed to them that the State Insurance Bill offered a possible means to this end. The whole industrial community were to be compulsorily insured against sickness; while some 2½ millions were to be insured against unemployment. The tendency among organized workmen would be to have each separate Trade Union registered as an approved society for sickness insurance purposes. The Committee, after mature deliberation, were of opinion that it would materially strengthen the Unions, and consolidate the Trade Union movement, if the various Societies were grouped together into as few groups as possible; that each group should be made the sole channel of receiving and paying the money obtained from the Treasury for the purposes of sickness insurance; that the duty of administration should, so far as the Treasury requirements admit, be assumed by a representative body elected from each separate group; and that a united and immediate effort should be put forth to induce the Government to make such alterations in the Bill as would admit of these suggestions being carried out.

The passing of resolutions of all sorts and conditions was then proceeded with—many of which must be passed over. Some of them were of the sweeping order which one has come to look for in connection with the large requirements of Trade Unionists. Quite early, for instance, the Congress instructed the Parliamentary Committee to do all in its power to oppose the Bills of railway companies, public authorities, and private companies refusing to recognize Trade Unions, and to "endeavour to secure by enactment the establishment of a fair wage principle and improved conditions for all workers." The placing on the market by the authorities, at a low price, in ever-increasing quantities, of prison-made mats, is naturally against Trade Union principles. Then the Parliamentary Committee came in for another "instruction"—that they should take steps forthwith to persuade the Government to secure the appointment of a Royal Commission or else a Parliamentary Committee to inquire into the whole field of industrial life assurance, with a view to its nationalization. Later, the nationalization of the railways was called for. This is a pet idea with some people; but perhaps it was a little unkind of one of the delegates to admit that "the resolution had been put forward for the last nineteen years." In these times of change, it is more than usually dangerous to prophesy; but one may hazard the opinion that opportunity will be allowed the Congress for bringing it forward for at any rate another nineteen years—that is, if reliance can be placed upon a recently published estimate that the securing of the eighteen leading English Railway Companies might cost the State upwards of £860,000,000, reckoned at twenty-five years' purchase, apart altogether from any allowance for prospects. The complete reversal of the law as laid down in the celebrated Osborne case was called for; and the meeting then adjourned.

The proceedings on Wednesday were devoted largely to consideration of the advisability of establishing a Labour daily newspaper, and to discussing a resolution in favour of the institution of "a real citizen army, entirely free from military law in times of peace, and officered completely by the selection of the rank and file." On the first matter, nothing definite was settled; but the citizen army was sent to the "right about" by a large majority—one delegate, in the course of a strong speech in opposition, quietly asking how often the officers were to be elected. A nice little string of seven resolutions was passed, all dealing with workmen's compensation. The last of these once more "instructed the Parliamentary Committee"—this time to "immediately" press the Government to appoint a Departmental Committee to inquire into the working of the Compensation Act of 1906, with a view to the inclusion of needful amendments. Next day the Congress expressed strong disapproval and condemnation of the system of fining in the textile and other industries, and "urged the Parliamentary Committee" to impress upon the Government the immediate necessity of passing a law to prevent deductions for any purpose or cause whatever from wages earned. The Labour Exchanges having been criticized, the Congress rejected a motion which was in favour of making any national insurance scheme wholly non-contributory. Subsequently, however, a resolution was passed to the effect that any scheme of State Insurance must place the whole burden of insuring all workers, whatever their age, whose wages are less than 15s. per week, upon the State and the employers; as also was one claiming, among other things, that persons with wages below 25s. should be called upon to contribute less than higher-paid men, or else be relieved of all payments to the scheme.

Some liveliness was witnessed on Friday, though the sitting opened quietly enough. A resolution was passed to the effect that the Congress, "recognizing the increased power of the capitalists, in closing-up their ranks and in their adoption of improved methods, deplores the lack of similar consolidation among the workers. It urges, therefore, the Parliamentary Committee to take steps to call conferences of the different industries, with a view of amalgamating the several Trade Unions connected with each industry." It was also agreed that there is need for legislation to put an end to employers using the weapon of eviction during trade disputes. Of course, it is an advantage to have all the weapons, as far as possible, on one's own side. The transport workers having been congratulated on their "magnificent efforts" to redress grievances, it was decided that "no effort shall be spared by the forces of organized labour to arouse and maintain the discontent of underpaid workers with their condition, and to quicken and assist their determination to use all possible means to win for themselves a living wage." This holds out promise of further activity. Mr. Will Crooks and other Labour Members were next severely criticized for introducing a Bill into the House of Commons dealing with labour disputes, without the authority or consent of either the Trade Unions of the country or the Labour Party; the resolution of protest concluding with the words: "We desire to make it clear that we will by every means in our power resist any attempt to prevent or hinder the right of the workers to strike at any time, when we consider such action necessary in defence or furtherance of their rights." The extensive powers now exercised by the permanent officials in the various Government Departments was next condemned as detrimental to the democratic progress of the nation; and a number of resolutions dealing with mining matters followed. Afterwards the "unsatisfactory interpretation given to the fair wages resolution by the permanent officials of the various Government Departments" was the subject of a series of motions, as were also the questions of wages and hours of labour. A long resolution on the "Trades Unions Education Policy" was brought forward; and on Mr. J. Sexton attempting to speak against it, the delegates at first refused to hear him. An unruly scene ensued; and the President ordered Mr. Sexton to retire. This, however, he refused to do; and finally Congress settled down to hear what he had to say.

The final session, on Saturday, was largely taken up with elections. In this connection, it was announced that Mr. Will Thorne, M.P., had been chosen as Chairman of the Parliamentary Committee, and would therefore be President of next year's Congress, which will be held at Newport (Mon.). Among the resolutions passed was one drafted by the General Purposes Committee to meet the demand for unification of labour forces. It expressed the opinion that steps should be taken to unite in one effective central organization the various Unions and Societies at present comprising the Trades Union Congress and the Labour Party, with the object of providing the same facilities for the discussion of Trade Union and Labour matters as at present exist. The Parliamentary Committee were instructed to co-operate with the Executive of the Labour Party in formulating a scheme for the establishment of a central body having this object. One delegate, in the course of the discussion, expressed the opinion that to merge the industrial side of their work into the political was a step in the wrong direction. Yet another motion called for the reorganization of the jury system, and for the appointment of a Royal Commission to inquire generally into the "present method of administering justice as between plaintiff and defendant."

## Scottish Junior Gas Association—Eastern District.

The Hon. Secretary of this Association (Mr. W. Geddes, of Granton) has issued a poster for display at all the gas-works within the district, giving an account of the business to be before the Association during the ensuing winter. The syllabus sets forth the following arrangements: Sept. 30. Opening Meeting, to be held in Edinburgh. Business: The address of the President, Mr. John R. Moyes, of Granton, and an address by Mr. A. Canning Williams, of Edinburgh, on "The Financial Department of a Gas Undertaking." Feb. 17. Visit to the Granton Gas-Works. March 9. Quarterly Meeting, to be held at Dunfermline. Business: "Vertical Settings *v.* Horizontal Settings," by Mr. R. J. Philp, of Dunfermline. Question Box. March 30. Joint visit with the Western District to the Alloa Gas and Electricity Works. May 4. Visit to Messrs. Stewarts and Lloyds, Limited, of Coatbridge. May 25. Quarterly Meeting to be held at Perth. Business: An address by Mr. W. B. M'Lusky, and a paper on "Carbonization in Bulk," by Mr. E. H. Scott, B.Sc., of Granton. June 15. Visit to the meter works of Messrs. James Milne and Son, Limited, of Edinburgh. July 6. Annual general meeting, to be held in Edinburgh. Business: "Coke-Oven Gas and Town Lighting: The Direct Recovery of Sulphate of Ammonia," by Mr. W. R. Barry, of Alloa.

# WILLIAM YOUNG:

## AN APPRECIATION.

By Alfred Daniell, M.A., LL.B., D.Sc., F.R.S.E.,

ADVOCATE AND BARRISTER-AT-LAW.

*With an Appendix, being an Index to all Mr. Young's Published Writings and Recorded Utterances on Technology.*

[**Prepared for the "William Young Memorial Lectureship" of the North British Association of Gas Managers.**]

On March 1, 1907, we lost our guide, philosopher, and friend, Mr. William Young, at a comparatively early age, as things go now, for he was only in his sixty-seventh year, and was in the full swing of an intellectual activity which seemed progressively to increase and to expand to the very end. But he had lived a strenuous life of service to the gas industry and to the shale industry of Scotland, the value of which it is beyond words to tell. His loss we then felt, and still feel, to be irreparable in every way; but the memory of his presence and his guidance and example are with us, and the North British Association of Gas Managers has decided to found a William Young Memorial Lectureship to keep his memory green among those who come after us. The Association has done me the very great honour of asking me to write an introductory appreciation of Mr. Young. I feel the honour deeply, but I also feel my own inadequacy to the task of doing anything like full justice to the memory of my friend. I fear I can do little more than give, and that very imperfectly, a general idea, to those who did not know him, of what manner of man he was and what the nature of his work and services has been. His presence itself was an inspiration; and words are feeble as means of conveying the impression which his personality produced.

Mr. Young lived but little in the public eye; and Scotland at large knew but little of one of its greatest sons. But in the circles in which he spent his active life he commanded an admiration, a respect, a confidence, and an affection which made him the man of men among us.

The incidents of his unassuming and straightforward life are plain and simple. Born in 1841 at Selkirk, the eldest son of Mr. John Young, the Manager of the Selkirk Gas-Works, who was himself a man much looked up to as an adviser in gas matters, William Young was brought up amid gas working and its problems; and in 1854 Mr. John Young with his family removed to Dalkeith, where for the next fifteen years he was Manager of the gas-works. He was much in request as an experimental lecturer on chemical and physical subjects, and his son William learned much through helping him with his demonstrations. Mr. William Young always spoke, to the end of his life, with the highest affection and respect of his father and his mother; but the young lad seems also to have found what he called a "scientific father" in the person of Mr. Peter Brash, a soap, candle, and oil manufacturer, of Leith, who took a deep and active interest in him, and gave him facilities for pursuing his scientific studies, which he carried on under Professor Lyon Playfair (afterwards Lord Playfair) and others in Edinburgh. Meanwhile, the lad had been apprenticed to a plumber in Dalkeith, and the journeyman who had to teach him his trade was none other than our excellent and lamented friend the late Mr. Bell, sen., of the Dalkeith Gas-Works. Mr. Bell found the lad to have a restlessly inquiring and inventive spirit, and to be continually improving the ways of doing things. At the age of twenty-two, we find Mr. Young engaged as Manager of the Lasswade Gas-Works. The works was a small one, but it presented its opportunities, for close at hand there was a large bing of waste shale, or, rather, shale brought up from a coal pit and thrown aside as waste. Mr. Young thought it might be possible to make gas out of this, and asked permission to take a sample. He was offered the whole bing if he would only take it away. He set to work, and made some 8000 to 9000 cubic feet of very good gas per ton. This turned his attention to shale and its problems, and ere long Mr. Young was managing shale oil distillation not only at the gas-works but also at the coal pit. At that time the shale oil industry was in a very bad way; oil was made in horizontal retorts partly filled with shale, but the products were charred, and, of course, there was no such thing then dreamed of as a yield of ammonia. William Young thought it out; the problem was how to get the products away without their being charred on the way out. Mr. Brash took a practical interest in the experimental work, which was carried out at Lasswade, and presently he got Mr. Young appointed as Manager of the Straiton Oil-Works. The result was what has been called the salvation of the Scotch shale oil industry, by a vertical retort, in which the products were first condensed as far as possible and were then heated and swept through the shale in a downward direction, so as to clear out the condensable constituents of the vapours as quickly as possible, and thus remove them out of harm's way. The two patents, under which oil of good quality was now obtainable, were No. 1278 of 1866 and No. 650 of 1867, both in the names of William Young and Peter Brash.

In 1874, Mr. Young left Straiton to become the Engineer to the Clippens Oil Company, which had just put up large works near Paisley in order to apply his methods; and for the same Company he also designed and managed new works at Pentland, near Edinburgh, capable of treating 300,000 tons of shale per annum. But he also kept experimental plant going at Straiton. The outcome of the Straiton experiments was the distillation of shale at two temperatures, with recovery of nitrogen as ammonia. Meantime Mr. George T. Beilby, then Chemist to the Oakbank Company at Mid Calder, had arrived at the same result. Mr. Young's patent was applied for in April, 1881, and Mr. Beilby's a month later. The two patentees joined forces a year later, and very soon practically all the shale oil in Scotland was made in Young and Beilby retorts or modifications of them. In 1885, Mr. Young was able to retire from active managership and became a Consulting Chemical Engineer, residing at a quiet little cottage, Priorsford, on the banks of the Tweed at Peebles. Later on he purchased the estate of Harehope, among the hills not far away from Peebles, and found an occasional resort to the air of the hilltops suit his health, which had by this time become seriously impaired. But the indomitable energy of the spirit of the man was so great that between playing the part of an enthusiastic fisher, keeping up continuous plain living and hard thinking, carrying on experimental work of his own and keeping up with the work of others, not only in his own field but in scientific matters generally, he was able to keep on, in spite of the ill-health which periodically laid him aside, rendering continuous service to both the shale and the gas industry. In particular, in 1892, the gas world was startled by the announcement of a process for the manufacture of a truly permanent gas from the heavy oils which had at the time become a drug in the shale oil market. This process was one of great promise, and in itself was a triumphant success; but Welsbach mantles, carburetted water gas, cheaper cannel, and high heats in carbonization told against its utilization for enrichment, and Mr. Young had to devise other solutions for the problems of the day, of which some will be found referred to later on, while others will no doubt be touched upon by Dr. Colman in the first of the William Young Memorial Lectures.

Mr. Young's keenness of interest in his work never abated to the end; and his powers seemed to grow as he went on. As the apprentice lad was, so was the man; whatever he touched he tried to improve. He was the keenest of observers in everything, in Nature as well as in his own work; and what he observed he never forgot. It would set him thinking, perhaps years afterwards, when knowledge on the particular point was likely to be helpful. He always pressed forward, making at all times some advance upon his own previous knowledge. The simplest observed fact was of importance in his eyes; it was bound to be an indicator as to something beyond. Hence it is that with him a long, long train of work takes its origin in the simplest of observations; and as I feel I cannot do justice to the whole of Mr. Young's life work, my readers will perhaps bear with me while I attempt to show, by way of typical illustration, how from the simplest of beginnings Mr. Young developed and applied the principles affecting condensation. If I do so my readers will probably understand better than from any amount of eulogy what manner of man we have had among us, what manner of man we have lost.

### CONDENSATION IN THE EARLY DAYS.

It appears, then, that in the early days, away back in the sixties, Mr. Young's brother-in-law, Mr. Cusiter, was occupying himself with the question of the choice of a good liquid for use in gas-meters. Water was troublesome, because it evaporated; glycerine was tried, but did not seem to give complete satisfaction for other reasons. Mr. Cusiter asked Mr. Young for some suggestion. Mr. Young, turning over in his mind the requirements, which were that the liquid should not evaporate at ordinary temperatures, should not freeze, should not mix with water, should not corrode the metal, and should be quite cheap, promptly suggested the use of intermediate paraffin oil, which would meet all these requirements, and, besides, would act as a good lubricator inside the meter.

The last thing either Mr. Cusiter or Mr. Young thought of, or was likely to think of at that time, was that such oil, if used in a gas-meter, would rob the gas of its illuminating power. Neither of them knew in the least that such a thing could happen at all. But they were both experts in matters concerning gas and shale oil; and, if Mr. Young and Mr. Cusiter did not know, then clearly the fact was not known—in practice, at any rate.

To-day, with our present range of knowledge, we might find it difficult to realize that there was a time, and that not so very long ago, when so elementary a fact as this still remained to be discovered or to enter into the domain of practical knowledge. One

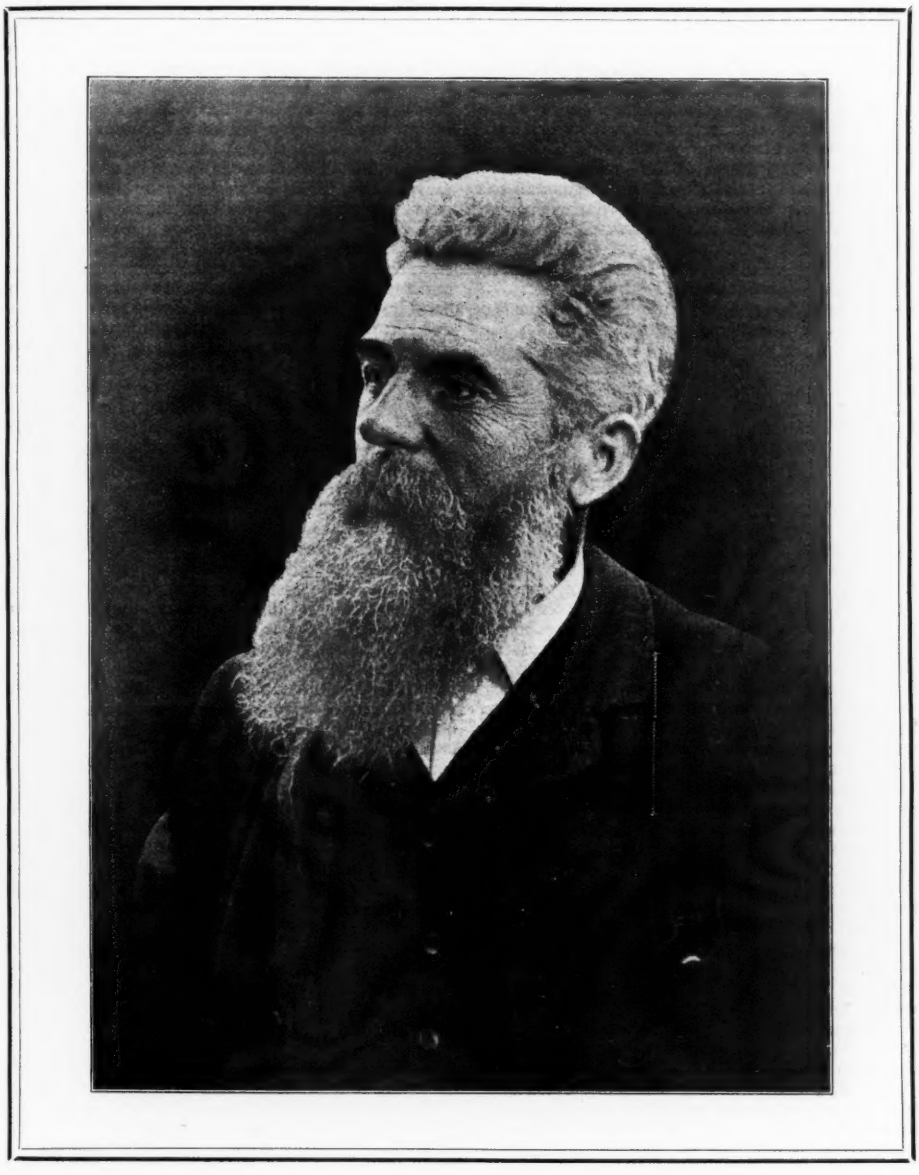
might possibly say that Mr. Young was fortunate in the time at which he brought his alert and powerful mind to bear upon the problems of the gas industry, which was then, after an earlier period of great scientific activity, more or less resting on its laurels and relying upon a settled and established routine.

Be that as it may, the two friends, like good men and true, set to work in order to see how far the suggested liquid would serve the purpose; and they were both intensely astonished by the unexpected result that the gas which was passed through the meter, when the meter was filled with this liquid, gave no light, or gave much less than before.

To our minds to-day the explanation would appear perfectly clear and simple. Evidently the oil had robbed the gas of something in it to which its illuminating power had been due; the oil had dissolved something out of the gas.

But Mr. Young and Mr. Cusiter had to begin at the beginning and interrogate Nature by experiment in order to reach an explanation of the strange phenomenon. Unhappily, Mr. Cusiter died at a very early stage of the inquiry, which was carried on by Mr. Young; and, very fortunately, the inquiry had fallen into exactly the right hands. It did not result in a barren statistical paper to some learned society—say, upon the "Coefficients of Mutual Solubility of Hydrocarbons of the Paraffin, Olefine, and Benzol Groups"—or anything of that kind; for it had fallen into the hands of a man who was not only keen in hunting and following up the essential facts, but also keen in perceiving how they might be turned to account and applied in the practice of the arts to which he had devoted his life, and in regard to which his knowledge was already excelled by none.

The central fact was soon got at, that the heavier oils dissolved the illuminating hydrocarbons out of the gas, and that then these hydrocarbons could be recovered from the spent oil by volatilizing them out and condensing them into the form of light spirit. But to Mr. Young's practical mind this immediately suggested a prac-



tical problem, and the solution of it in another sphere—not in that of gas manufacture, but in that of shale oil-making.

Some of the members of the North British Association of Gas Managers may remember the appearance presented in many a place by night at that period—"Dixon's bleezes" and all the rest of it—the countryside being illuminated at night by enormous flames of products running to waste, which are now more economically if less picturesquely recovered and collected for sale and for use. The shale oil industry, in the same way, suffered, perhaps without much sense of suffering, since at first very high prices were obtainable for the paraffin that was actually made. But still it suffered—in the sense, if you like, if permitted—a continuous loss of products in the waste shale gases. These waste shale gases were really a very good permanent illuminating gas, and for many years Bathgate and Mid-Calder were supplied with gas from the shale works. But in most works these waste shale gases had to be got rid of, though they deserved a better fate.

Mr. Young's practical mind at once suggested to him that the new principle might enable something of value to be recovered from these waste shale gases; and he devoted himself to experiments, which lasted for several years and opened up quite a range of successive new ideas, and, we may say, gave him a splendid training in the exercise of his wonderful observing faculties.

### EARLIEST ASSOCIATION PAPER.

Meantime, although personally engaged in the shale oil industry, he had not forgotten the gas industry, whose problems, being in a sense the converse of his own, cast light upon the questions he was more immediately concerned with. And so we find him at last, in the year 1874, reading a paper before the West of Scotland Association of Gas Managers (now merged in the North British Association of Gas Managers) upon "The Absorption of the Illuminating Constituents in Coal Gas by Heavy Hydrocarbons," in which he announced the fundamental facts as discovered by

Mr. Cusiter and himself, and afterwards by himself, and pointed out some respects in which the knowledge of these might be of service to the gas industry.

It is strange nowadays to see what a sensation this paper produced at the West of Scotland meeting. The facts brought forward were all new and strange to the members of the Association, which comprised names we have all traditionally borne in high respect. Mr. Key, of Accrington, said they were peculiar, and sufficient to make us wonder.

The paper itself was a very plain and simple one, and very modest, but, at the same time, within its limits, very masterly. He told how, in the gas-meter, oil of ·840 brought down 35-candle gas to 16·1 candles, and the bromine condensation from 17·4 to 6·2 per cent.; while with 28-candle gas the candle power fell to 14, and the bromine condensation from 11·8 to 5 per cent. He narrated the different effects produced with paraffin spirit of ·768 and ·810, with ordinary burning oil of ·820, with refined oil of ·840 and ·860, and with blue oil of ·895, and showed that, while the effects were all similar, the heavier the oil the greater was the effect. Then he proceeded to show—and this lies at the basis of much of his subsequent work—that the effects produced depended upon the temperature. For example, that, while with oil of ·768, used at 50° Fahr., the loss of candle-power from 28-candle gas was only 5 per cent., if the oil had a temperature of 60° there was no loss of candle power, and at 70° there was a positive gain of 7 per cent.; and, further, that they also depended on the mode of handling, so that heavy oil, which could take away 65 per cent. of the illuminating power if the gas were simply bubbled through it, could take it entirely away if the gas and the oil were shaken up together. Then he showed that where the gas lost in illuminating power the oil gained in weight, and that the heaviest oils were found to gain most in weight. Then, to what material was this gain of weight due? It depended on the nature of the gas treated. When the spent oil was gently distilled it gave off a permanent gas and a volatile liquid; when the gas treated took its origin in a low temperature distillation, the liquid obtained (sp. gr. ·703) was very like a paraffin spirit, whereas if the gas treated was coal gas, from what was then called a high temperature distillation, the liquid obtained was of sp. gr. ·852, and closely resembled the first runnings of coal tar distillation, containing benzol and other hydrocarbons.

Now, having established his fundamental facts, we see the real Mr. Young beginning to emerge with his thoughtful suggestions. Plain and simple they are at this stage, but they are only his trial flight, and we shall see wider sweeps later on.

He suggests, then, that these facts may be turned to account in examining the nature of the illuminating constituents of gas. These might be such as to drop illuminating power on the way to the consumer; or, again, they might not. It depends on the coal and the temperature of distillation. Hitherto we have only had the bromine test to rely on, but this is inadequate; and it is better to get the actual illuminating constituents themselves out of the gas and to examine them. The suggestion is followed up by demonstration of an apparatus for the purpose of ascertaining the data, and by showing how to calculate out the results, and the remark is made that by returning the liquid to this apparatus in fractional instalments we can, from the vapour-tensions observed, ascertain precisely how far the gas is permanent at different temperatures. Such data would be of practical value as enabling the gas manager to select those coals which gave the most permanent gases at moderate temperatures, or else so to regulate the temperature as, from the point of view of permanence of the gas obtained, best to suit the particular coal in use.

Incidentally Mr. Young remarked, in the course of the discussion—and this is the germ of much that has followed since—that the naphthalene dissolved out from gas by heavy oils would tend to be retained by them upon re-evaporation, its boiling point being so near that of the oils.

It is worth while stopping for a moment to consider what Mr. Young's position was at the time. What was the novelty in his observations, and what was he in quest of in his practical experimenting? As to the novelty, it could not be, and was not, that he was the first man who knew that tars contained benzols and other valuable volatile components, or that some tars contained more of these components than others, and must therefore have got them from somewhere, or that gases deposit them in the tars if cooled down sufficiently, or that the tars would give them up to the gases if heated-up sufficiently in contact with them. All this was already well known, and formed part of the stock of public general knowledge. What he found was that the fractionated oils, from intermediate to heavy, would extract from gases the illuminating constituents, what we may call the gasolene products, and that to such an extent that even ordinarily permanent gases were absorbed. That was the novelty which was the outcome of the almost accidental observations made upon the effect of intermediate oil used in a gas-meter, and it was to the application of this in shale oil works that Mr. Young's attention was mainly directed during all the years of experimenting to which reference has been made.

But then, it has to be observed, that while Mr. Young had been devoting himself to his practical experimenting on the shale oil side, time had been slipping away, and other workers in the same field had not been idle, and a select few had come to realize that there were possibilities in the use of oils for absorbing and recovering light oils from waste shale gases. It appears that they did not at first, or at all, reach the stage of success which Mr. Young ultimately attained; but they did apparently attain some success, which gave rise afterwards to a sharp passage at arms, to which reference will be made later.

## THE AITKEN PROCESS AND THE AITKEN-YOUNG PROCESS.

Mr. Young was not the man either to forget the gas industry or to fail to draw inferences as to what ought to be done in the converse case of gas manufacture where the problem would be not to get hydrocarbons out of gas, but to keep them in it. His mind naturally ran at all times to the comparison of converse cases; and to this peculiarity much of his success is due. And be it remembered that the use of the Coffey still was well known in the chemical technology of the time in relation to the separation of alcohol and water; so that it would presumably have been quite easy for Mr. Young, given the analogous problem of separating volatile hydrocarbons from a solvent, to form a clear idea, even though he were not experimenting on the gas manufacture side at the time, that the way to set about solving the problem would be by the use of some kind of Coffey still arrangement.

Still, so far as questions of priority of statement of a Coffey still method of withdrawing the volatile hydrocarbon from the solvent and keeping them in the gases, for gas-making purposes, are concerned, there is no doubt that the priority of statement belongs to Mr. Henry Aitken, of Falkirk, who had, prior to Mr. Young's 1874 address to the West of Scotland Association, put in an application for a patent for a combined method comprising, among other things, the washing of gases by the tars in a kind of Coffey still. The date of the application (No. 2587 of 1874) was July 24, 1874; Mr. Young's paper before the West of Scotland Association was read on Oct. 10, 1874; and Mr. Aitken's patent was completed on Dec. 29, 1874. Mr. Aitken had several ideas. One was that gas would deposit hydrocarbons if it deposited moisture, and would not hold-up so much hydrocarbon if it contained moisture as it would if it were completely dry; so that if you are going to enrich gas you must first pass it over absorbents to take out the moisture. Another, and more to the purpose here, was that if you are going to use oil as a liquid in wet meters, you must use oil saturated with light spirit. Another was to maintain the the gases at a sufficiently high temperature, whereby either the the gases are prevented from depositing their hydrocarbons in the tars or else the volatile hydrocarbons become revolatilized from the tars into the gases. And, lastly, he showed a form of apparatus for treatment of the crude gases, in which there were several features to note. Of these, the first was that the tars as condensed were made to flow back towards the hydraulic main; light hydrocarbons which had deposited in them would be revolatilized into the gas; the gases would carry them forward to the condenser; there the light hydrocarbons would be inpart deposited; and the gas would leave the condenser saturated with these light hydrocarbons. But the gas was not yet done with; it was again passed over the hot-tar cistern to give it an opportunity of picking up more of these light hydrocarbons at the higher temperature of the hot-tar cistern; after it had left the hot-tar cistern it was again subjected to condensation and dropped what it had picked up from the hot tar; and thereafter it was sent out, saturated with light hydrocarbons at the atmospheric temperature. Then Mr. Aitken went on to show a method of treatment of the gases which in the text of the specification he described as carried on by successive stages. Take, for example, the gas at 200° Fahr.; cool it down to 150°; it will then, even though clean at 200°, contain precipitated tar particles. Baffle or filter these out. For this, various means are suggested, such as coke, &c.; but filtering through wire gauze is one of the means mentioned. After this filtration the gas is again clean, and is then subjected to another drop of temperature, which causes fresh precipitation and involves another filtering; and so on until the gas is brought down to the atmospheric temperature and leaves the condenser, saturated with the light hydrocarbons and freed from the tars. And then, particularly in the drawings, Mr. Aitken shows how this stage-by-stage treatment can be carried out in a kind of Coffey still. In this the bottom, where the tar collects, is kept hot and the top is cool. The gas as it enters at the bottom sweeps over the hot tar and is made to ascend in a zig-zag course between trays, in which the products of tar precipitation collect, overflow, and drip into the successive trays beneath, all the way to the hot-tar cistern below. The gas is not allowed to ascend from one tray to the one above without having to pass through a filter (say) of wire gauze, upon which the tar particles deposit, coalesce, and trickle into the tray immediately below—thus starting on their course, as tar in bulk, from tray to tray, towards the hot-tar cistern below. But as the tars descend they meet increasing temperatures, and are obliged to surrender to the gases more and more of the light hydrocarbons they may contain, so that by the time they reach the hot-tar cistern they contain but little of these. Then, in addition to all this, the settling of tar fog was promoted by sending gas at 190° Fahr. into a very large settling chamber, and keeping it there for as long as possible at that temperature; and, further, the capacity of the gas for retaining light hydrocarbons was kept at a maximum by removing the aqueous vapours. Such, then, is an outline of the Aitken patent of 1874, which was published in the early part of 1875.

Mr. Aitken and Mr. Young were very close friends, afterwards associated in the Aitken and Young process for condensation in gas manufacture, which for so many years reigned supreme; and the suggestion might occur to one that Mr. Aitken was more or less inspired by what he knew of Mr. Young's experimental work on shale gases. In fact, Mr. Young himself at a later date, in one

of his historical *résumés* (see "JOURNAL" Vol. 88, p. 241), goes farther, and says that the application of the Coffey still in Mr. Aitken's patent was his own device, though elsewhere, as we shall see, he gives the credit to Mr. Aitken for the filtering action of the wire gauzes. Be that as it may, it was the modified Coffey still part of the combination which proved of value, and we shall soon find Mr. Aitken and Mr. Young associated in a joint patent for an improved use of this.

### MR. YOUNG AS AN EXPERIMENTAL LECTURER.

This brings us to the beginning of the year 1875. In April of that year we find Mr. Young reading a second paper to the West of Scotland Association, on "Condensation in Crude Gases." For myself, I might almost say that I feel grateful to the Council of the North British Association of Gas Managers for having allotted to me a task which has made me turn up and read in the "JOURNAL OF GAS LIGHTING" this lecture or address of Mr. Young's. It has produced a great impression on my mind. One cannot go far in reading it without perceiving that, though it was only his second flight, Mr. Young was already a past-master in the art of experimental lecturing. The address, as reported, bears the marks of a kind of nervous but straightforward and confident earnestness, which makes it very telling even to read. It is no wonder that, as I am told, those who were privileged to hear these early addresses by Mr. Young have never lost the recollection of the impression that was produced upon them—such impression being possibly even greater than that produced by Mr. Young's more elaborately prepared and more comprehensive papers of later periods.

In this experimental address, then, Mr. Young followed up the preceding address by propounding a conundrum, which arose out of the practical experience of those before him. The idea upon which they all worked was to leave in the gas as much hydrocarbon vapour as possible, consistently with permanency in the gas sent out. The gas, as sent out, left the tars behind it; and in the tars there was light naphtha, 2 to 10 per cent., according to circumstances. But the gas was still capable of taking up light naphtha, to the improvement of its own illuminating power. Each 1 grain of light naphtha taken up per cubic foot of 12-candle gas improved the candle power by 5 to 10 per cent. The conundrum, then, was, why should the gas ever have dropped the light naphtha into the tars? What had prevented the gas and the naphtha from keeping together during the manufacture; and what caused the naphtha vapours to be removed along with the tars?

The setting of this poser led at once to a fine series of experiments, in which Mr. Young demonstrated that the more volatile a liquid hydrocarbon, the greater the volume of it which would spontaneously evaporate into a given volume of air or of gas, and, again, that the same result followed from raising the temperature or from reducing the pressure. He took a mixture of air and light hydrocarbon vapours; he introduced a small quantity of heavy hydrocarbons; immediately there was a shrinkage; and the heavy hydrocarbons robbed the air of the light hydrocarbons, or a good proportion of them. Reversing the experiment, he brought air and heavy oil into contact; then he added light oil; the air took up some of it and expanded a little, but not nearly as much as it would have done were the heavy hydrocarbon away. The presence of the heavy hydrocarbon, it was thus shown, very much reduces the volatility of the lighter hydrocarbon. Then, further, the heavier the heavy hydrocarbon, as compared with the light, the greater is this effect; so that very heavy hydrocarbons may even retain olefiant gas. But, then, if you keep on supplying successive doses of light hydrocarbon, the heavy hydrocarbon slackens off in its absorption, and ultimately fails to produce this effect. It has become saturated.

Now turn your attention to the heavy hydrocarbon saturated with light hydrocarbons. Heat it up gently; the most volatile of the light hydrocarbons seems to come off first. After a while the light hydrocarbons have all evaporated out of the heavy hydrocarbon, at a temperature which is higher the more of the heavy hydrocarbon there is present, or the more saturated the air becomes with the vapours. Keeping it all closed in, you then let the whole thing cool to the original temperature; the heavy hydrocarbon re-absorbs all the light hydrocarbon vapours, which are condensed into the heavy, and disappear. But, instead of letting the light hydrocarbon vapours cool down in presence of the heavy hydrocarbon, withdraw the latter and let the former cool down by themselves. They will then partly condense, but only partly. There will therefore, on cooling in the presence of heavy hydrocarbon, be re-absorption of light hydrocarbon vapours where there would not be condensation of them in the absence of these.

Then, further, ordinary coal tar, under certain conditions, has similar properties. Mr. Young passed coal gas over tar which had been denuded of its light naphtha, and showed that this treatment of the gas brought down its flame-length from 5 inches to 4·6 inches, and reduced its illuminating power by 20 per cent. On the other hand, do the same thing with ordinary tar, and little or no effect is produced. But, if you heat up your ordinary tar, it enriches any gas passed over it.

Mr. Young pointed out that all this was instructive as regards the current practice in gas manufacture. The crude coal gas was rapidly cooled to 100° to 150°; the tars were liquefied, but took the form of tar-fog, which travelled along and was reduced to the temperature of the atmosphere before it was stopped. The practice also was to send the deposited tar and the ammoniacal liquor in the same direction with the gas, for the twofold purpose of allowing the weak liquor to strengthen and of allowing the tar to take up naphthalene and sulphur compounds. This practice Mr. Young stigmatized as objectionable in principle.

Above 100° Fahr. all goes well; the tar particles remain destitute of light naphthas, which they do not absorb from the gas. But below 100° Fahr. they can and do absorb light naphthas from the gas, which they rob of some of its illuminating power, while they themselves are brought to the condition of our ordinary tars.

The practical problem then was, How to prevent the tars from absorbing these light naphthas out of the gas or from retaining them. There are many ways. One of the simplest would be to raise the condensers a little above the hydraulic main and make the tars run back through the hydraulic main on their way to the tar cistern. Then the tars as they travelled would meet higher temperatures; and the light hydrocarbons would be partly revolatilized out of them. But the method preferred is a kind of Coffey still analyzer.

Here Mr. Young gave an account of a Coffey still analyzer arrangement which is so fully identical with the form of Coffey still described in Mr. Aitken's patent, in which the tar particles are filtered off by gauze—except, perhaps, that Mr. Young laid more stress upon running the whole of the condensates back into the analyzer, and the advantage of having plenty of light hydrocarbons present in order to promote precipitation of the tar particles, and also upon the effect of the analyzer in keeping the volatile ammonia as well as the light hydrocarbons out of the tars—that I need not here recapitulate the description of a Coffey still which I have already given when referring to Mr. Aitken's patent. Mr. Young added that shale oil experience showed that the tars were not likely to harden through being kept hot in the hot-tar cistern.

So far, then, for Mr. Young's second paper before the West of Scotland Association, and you will perhaps have noticed three things. First, that his own line of thought and demonstration leads him by a direct path to the use of a Coffey still analyzer; second, that he speaks of the analyzer as something the probable working of which was capable of being illustrated by shale oil experience; and third, that he does not mention Mr. Aitken's name. Now, no one who knew Mr. Young would dream for a moment of thinking that if he meant to describe an analyzer devised by Mr. Aitken he would do otherwise than to say at once that it was Mr. Aitken's analyzer. Be all that as it may, Mr. Aitken and Mr. Young co-operated heartily, and the result was soon shown in their joint application, on the 3rd of August in this same year, 1875, for a patent for the "Manufacture of Gas." This was for what was afterwards known as the Aitken and Young method of condensation, or treatment of gases during condensation, in the manufacture of gas. Coupled with this, in the patent was a method of economizing the carbon in coke containing much ash, and of removing and utilizing the graphite in the retorts.

### THE AITKEN AND YOUNG PATENT.

It may be said that the central part of the Aitken and Young plant was the Coffey still as Mr. Aitken had described it, among many other things, in his patent of the year before, and that a number of improvements were made in regard to getting the best value out of its use. For one thing, it itself was made to act as a kind of fly-wheel, storing up light hydrocarbons when the gas was too rich, and giving them out when the gas was too poor. Perhaps it would have done that in any case; but the idea was carried farther. Mr. Aitken's analyzer, as we shall call it, had succeeded in sending the gases on highly charged; but in practice there was always some hydrocarbon vapour retained by the tars. The aim of the new plant was to get as much as possible of this into the gas; and if the gas would not carry it permanently, then to provide gas in order to carry it and to remove the excess of light hydrocarbons which had accumulated in the analyzer. For this purpose a poor gas would do. In a small works, then, one might realize an alternation of this kind—first, go on making coal gas in the usual way from the coal and cannel then used, until the analyzer tars come to contain an undue proportion of naphtha; then run poor gas through, made by steaming the hot residue in the retort. This steaming, naturally, makes water gas at the expense of the graphite on the retort walls and of the carbon of the coke. But any other poor gas might do, as, for example, gas from peat or from spent bark or from sawdust, &c. In larger works the thing would not be quite as simple as this plain alternation. Therefore the specification provides other arrangements for producing bituminous gases and the poor gases apart from one another as required and mixing them in the retort; or condensing the rich gases apart, and enriching the poor gases with the tars from the rich gases; or, again, sending poor gases and the rich gases both into the analyzer, the rich gases high up, so that their hydrocarbons may be chilled-out and drip down to meet the poor gases struggling up from below; or, again, the tars may be entirely denuded of naphthas by heating them highly.

The process as a whole relied upon the combination of rich gas making with that of water gas or other poor gas—the latter being carburetted by hydrocarbons from the rich gas; upon using the surplus hydrocarbons to enrich a volume of poor gas, either by passing it over the tars or by mingling it with the rich gases (it may be in the retort or it may be separately), and subjecting the whole mixture to condensation, the condensed tars being kept hot; and upon the use of poor coke to make a poor gas for the preceding.

Such, in outline, is the nature of the Aitken and Young process;

but, be it remembered, the central point of it is, after all, the use of the Coffey still, or analyzer, with its fractional condensation. If there were no surplus of hydrocarbons, no excess of naphthas, there would be nothing for the poorer gases to do, and no enrichment for them; they would simply spoil the better gas, except, of course, in so far as, if led directly into the retorts, they might protect the better gas from destruction, as in one of Mr. Young's shale oil patents of 1866. But that would be a different story. A quarter of a century later, in his 1900 address to the North British Association of Gas Managers, looking back over the history of methods in use in gas manufacture, Mr. Young pointed out that such had, in fact, been the experience of the Aitken and Young process. With ordinary coals, there never was a stage at which there were more hydrocarbons than the gas could carry; and the added water gas in that case did more harm as a diluent than it did good by taking up benzol, &c., from the tar. But oils, cannels, and shales always did present such an excess; and the addition of the water gas in these cases was of advantage.

### THE CONVERSE PROBLEM.

The next item in order of time is a patent applied for by Mr. Young in September, 1875, for "Obtaining Hydrocarbon Vapours from Gases." This represented the outcome of the long-continued experiments on the recovery of the illuminating constituents from the waste shale gases, to which reference has already been made. It seems to me, if I may say so, that the whole construction is very characteristic of Mr. Young's designing. We have, then, a tower, made up of three parts. An upper part, A, filled with coke; a non-conducting partition, B, between the upper part and the lower part; and a lower part, C which is a Coffey still arrangement. A has an inlet pipe for gas at the bottom and an outlet pipe for gas at the top, opposite to the former, and has also means for letting oil drip down from the top upon the coke which fills A. C has a steam pipe led in at the bottom, and a pipe leads from the top of C to the condenser. There is also an outside worm D, and a closed vessel surrounding it, and the needful connections for operating the following cycle: While the waste shale gases are entering A by the inlet, traversing the oily coke in an upward direction and leaving by the exit pipe—for whatever may be the destination of the denuded gas, the cold oils travelling down the coke in A are led off to the worm D. In this worm the charged oils from D are heated by denuded oils from C; and these charged oils then go to the top shelf of C. Here they meet an ascending current of hot steam; and as they overflow the shelves in C, and descend, they become still hotter, and become completely denuded of the hydrocarbons they had picked up in A. Now they are sent round the worm D to warm it in their turn; and then they are cooled down and sent once more to do duty as cold absorbent oil in A; and so on round the cycle of operations repeatedly. A relatively small quantity of oil is thus made to serve the whole purpose of absorbing hydrocarbons from the gases while cold, carrying them to the steam, and surrendering them to the steam when hot, all in rotation; and the hotter portions of it, denuded of the hydrocarbons, are made to heat up the cooler portions. The steam which has become charged in C is led off to a condenser and the gasolene is there recovered. Then, by way of further economy, to save steam, A is made strong enough to stand pressure; the gases and the oils are pumped into it, and the oil absorbs the gasolene hydrocarbons under pressure, and therefore absorbs considerably more of them, bulk for bulk. The quantity of oil required is therefore reduced by this; and the super-saturated oils very rapidly and readily give up their charge in C, so that less steam is required, and correspondingly less cooling is required in the condenser. Incidentally, the outlets from A must, of course, be controlled so as to maintain the pressure in it; and the expansion at the outlets may be utilized either to work the pumping of oil into A or to help to cool the denuded oil which is to enter. The oil used for these purposes was, under the guidance of experience, intermediate oil of ·830 to ·860 specific gravity.

This method, the direct ultimate outcome of the early observations on the effect of intermediate oil on the illuminating power of gas passed through it in a gas-meter, at once proved a success; and some years afterwards Mr. Young was able to speak of it as having been the means of recovering millions of gallons of light oils, which might otherwise have gone to waste, from the waste shale gases.

### DEVELOPMENTS IN THE AITKEN AND YOUNG PROCESS.

The Aitken and Young process also proved a success. It was well adapted to the current practice of the time, in which there was always plenty of cannel and other rich coal. It found almost immediate acceptance; and it was in no way a long time before it revolutionized the practice of the gas industry. Fractional condensation, with a counter-current, took the place of sending the tars and the gases in the same direction.

Meantime, during 1876, Mr. Young was a prominent figure at the Associations. In April he read a third paper to the West of Scotland Association, on "The Manufacture of Illuminating Gas." After showing the difficulty, or, rather, the impossibility, of hitting off and maintaining an ideal carbonization, under which the maximum sperm value was produced and carried in just enough gas to convey it, and, after critically discussing the various methods which had been suggested for promoting uniformity, he comes to the conclusion that it is not of advantage to crack-up coal tar naphthas, but that they should be used as means of enrichment. For example, a gallon of coal-tar naphtha, cracked-up, will give from 50 to 90 cubic feet of 16 to 30 candle gas, or a sperm value of, say, about 6 lbs.; whereas the same gallon of naphtha, diffused through 10,000 cubic feet of 12-candle gas, will raise it to 14 to 18 candles, where even the lowest figure corresponds to a sperm value of 68¼ lbs. Where we have a thoroughly poor gas used, such as water gas, our gallon of naphtha will bring 500 to 1000 cubic feet of it up to 15 to 20 candles; and the sperm value in such a case is, say, 25¾ lbs. The percentage return from the addition of water gas to take up the surplus hydrocarbon is found to be better than from the addition of poor coal; but the difficulty in methods involving the addition of water gas is the difficulty experienced in regulating the access of the latter, so as to follow the variations in the richness of the better gas produced. Any method which would store up an excess of hydrocarbons produced at one time, and would give them off when the better gas was poorer, would get over this difficulty, and would allow the supply of water gas to be maintained more nearly uniform. In current practice the condensers had been set to do too much, to act as purifiers as well as condensers; and the result was that we were providing the very best conditions possible to supply the tar distiller with benzols. The tar distiller uses a Coffey still; this is the idea we ourselves should apply, and it is applied in the Aitken and Young condenser. In this, according to the description of it, the rich gas may be followed by a poor gas to wash out the excess of light hydrocarbons; but the result is quite similar if a richer gas is followed by a poorer gas in one and the same carbonization. If water gas be used, it is best to send it direct into the retorts; for then it appears that it shields the hydrocarbons of the better gas from decomposition within the retort. The right amount of it can be determined by preliminary trial as to the bulk to which the whole may be brought up before the candle power falls below the determined value; then simply see to it that the total make does not exceed so much per ton of coal carbonized. In the Aitken and Young plant, the tars are not allowed to retain nearly as great a quantity of impurities ($NH_3$, $H_2S$, $CO_2$, sulpho-hydrocarbon compounds, &c.) as hitherto; these things are left over to be dealt with by the washer. The gas reaches the washer very free from tars; and the washing is much cleaner and more efficient. The water from the bottom of the analyzer is capable of taking up $NH_3$, while it is still too warm (Hills) to take up $CO_2$ or $H_2S$; and by regulating the temperature of it we can make it take up $NH_3$ alone, or else $NH_3$ along with these other impurities, in addition to the sulphocyanide of ammonium which it generally contains in any case. In remoter districts it might be possible to make the rich gas from good coal, and the required supplement of poorer gas from local supplies of peat and the like.

### MR. YOUNG'S FIRST N.B.A.G.M. PAPER.

In July came the annual meeting of the North British Association of Gas Managers; and Mr. Young, who had been elected a member at the previous meeting, made on this occasion his first communication to the Association. He took as his theme a particular use which he had found for the gasolene condensate from waste shale gases—namely, as an absorbent for bisulphide of carbon and other sulphur compounds in gas other than sulphuretted hydrogen. He narrated the accidental observations which had originally led up to the investigations that had resulted in the recovery of the very volatile hydrocarbons from waste shale gases; and he pointed out that, in the condensate, components ordinarily gaseous were held bound by heavier liquid components, ranging up to a boiling point of 350°. The new liquid would serve well for air gas, which was, however, a wasteful thing on account of the inert nitrogen; better for enriching water gas, according to Mr. Spice's suggestion of 1875; best of all for enriching poor illuminating gas; or, failing these, it could be used in the old alcohol-benzol "vapour lamp." Mr. Young's first appearance before the Association was thus a characteristically unobtrusive one. But his announcement that the new condensate had a wonderful affinity for the sulphur compounds in gas, and held on to them through distillation in steam, was destined to bear not a little fruit later on—more particularly in an experimental address, on the "Elimination of Sulphur Compounds from Illuminating Gas," given before the North British Association in 1879. In that paper, to which a brief reference may be permitted in this place, he announced that it was not a *sine quâ non* that a liquid which facilitates chemical action between a gas and a solid, or between a gas and a liquid, should be a solvent for both; and that therefore it was sufficient to wet sulphide of calcium with this hydrocarbon liquid to accelerate the absorption of $CS_2$ and formation of $CaCS_3$ to an enormous degree, and that agitating an aqueous solution of NaHS with this liquid also had the same effect in making the whole very powerfully absorbent for $CS_2$. This liquid has, however, an independent, powerful, absorptive action upon sulphur compounds other than $CS_2$, upon which $CaH_2S_2$ does not act chemically in any way. The danger of $CS_2$ revolatilizing into the gas would only exist where the liquid was used as a mere absorbent, without any chemical reaction to take away the $CS_2$, and where the counter-current principle was not applied in washing the gas with the liquid. Tar naphtha could be used to take the place of this condensate; but this liquid condensate from waste shale gases is by far the best in actual use. As its hydrocarbons consist largely of paraffins, and not of benzols, it is not acted upon by the chemicals used to remove the absorbed sulphur compounds for the purpose of regeneration of the liquid.

The physical law involved in this latter paper is deserving of attention. It was generally believed at the time that the liquid intermediary between a solid and a gas must, in order to permit a chemical reaction between these latter, be a solvent for both. Dr. Odling had pointed out that an alcoholic solution of KHO would absorb $CS_2$, while an aqueous solution would not; alcohol was a solvent for $CS_2$, water was not. Sulphide of calcium also acted very sluggishly in absorbing $CS_2$, because the moisture on it was not a solvent for $CS_2$, as Dr. Odling had explained.

### ANOTHER EXPERIMENTAL ADDRESS.

In September of the same year (1876), Mr. Young gave another of his experimental addresses to the West of Scotland Association on the subject of "Condensation." He had pointed out in the course of the proceedings that it was of importance never to allow the heavy hydrocarbons to get into the gas at all, for they settled down in the drip-boxes and robbed the gas of light hydrocarbons as they condensed, to an extent which was really no trifle. Going on then with his own lecture, he gave a masterly *résumé* of the whole subject, with a list of the various products of distillation to refer to, and the problem put, how to separate these. He showed as before the solvent action of tars on the lighter hydrocarbons; coal gas will soften powdered pitch or caked tars; some American trials of pitched wooden pipes for gas had failed because the pitch spoiled the gas and went soft. Therefore get the tars away from the gas as soon as possible, and get the tar-fog separated. How is the tar-fog to be separated? Water will not do it; it does not wet the particles; naphtha does wet them (experiments with soot). Tar-fog can be separated (1) by causing condensation of naphtha vapours on the particles, so that they sink, or (2) by subjecting the particles to impact on surfaces wetted with naphtha. The tars themselves deposit in the first place upon the sooty particles; if the heats in the retort are too high, the soot chokes up the pipes, not being removed by a sufficiency of liquid tars deposited on the soot-particles. Tar which has found its way into the gas as sent out will blacken benzol through which the gas is passed. An experiment in which coal gas is first passed through light spirit, then through medium spirit, and lastly through dead oil, and thereafter gas is sent through the same liquids in the reverse direction, shows, by the great difference in the illuminating power of the flame, that the gas ought to be made to leave in presence of the lighter hydrocarbons, and that therefore we must apply a counter-current principle. The water condensate in hydraulic mains, at, say, 150° Fahr., is caustic ammonia (with some sulphocyanide of ammonium), not sulphide or carbonate at all. The tars hold on to sulphur compounds with great tenacity; and oils containing sulphur compounds, if passed through iron oxide, continue to strike a black colour with a solution of lead, whereas if passed through lime they do not, which shows that the sulphur is not present in the form of sulphuretted hydrogen.

The conclusions we may arrive at are, on the whole (1), we must keep the tars and gas warm until they have physically separated from one another; (2) in order to allow the tar particles to separate out we must keep the crude gas warm and let it travel slowly; (3) we should help the separation by having filtering surfaces wetted with naphtha or light tar oil, such as gauzes with condensates trickling down them, which keep them clean; (4) we must use a fractional process of condensation, in which the tars are repeatedly exposed to the absorption of light hydrocarbons, but are only allowed to escape at temperatures at which they cannot retain the light hydrocarbons, all which involves the application of a counter-current principle; and (5) we should aim at an equalizing action in which any naphthas produced in excess at one moment are held back until wanted by a poorer portion of the gas, subsequently produced. In the Aitken and Young analyzer the top tray is the coolest and contains the lightest naphtha, and all the trays contain a considerable bulk of liquid.

In the autumn of the same year the paper read as above before the North British Association elicited what Mr. Young called "a growl" from the Young's Paraffin Light Company, who said they had been using oil for nine years for extracting hydrocarbons from shale gases. Mr. Young's reply was that he had been able to point that fact out in his own patent; but that they had not obtained his results. The best they had done was a specific gravity of ·720, whereas the oil he showed the North British Association members was one of ·661, containing gases ordinarily permanent.

### A CHARACTERISTIC INCIDENT.

For some time after this the Aitken and Young process was being carefully investigated, in its practical working at Hamilton, by a Committee of the West of Scotland Association, and here a characteristic incident arose. The Committee, after working independently of Mr. Young, drew up a draft report which they invited Mr. Young to come and read and discuss with them. He promptly told them, when he saw their draft, that they had been getting results much more favourable to the process than he had been getting in his own experimental working on a smaller scale at Causewayhead and at Clippens, and begged them to withhold their report and repeat their tests. This they agreed to do, and did so. Working at higher heats in the retorts, and in very cold weather instead of very hot, they obtained results more like what he thought they should be for the purposes of a report. The Committee concluded that an expensive first-class coal in large quantities was not required to produce a gas of high illuminating power, and, further, that the only expense or trouble connected therewith was the providing of steam to keep up the temperature in the analyzer.

The North British Association also was very much occupied with the Aitken and Young process during the year 1877, and Mr. Young's remarks at the annual meeting were subjected to a very careful and full revision by him, of which the product is to be found in the 1877 "Transactions" of the Association.

We may now, I think, say that we leave the Aitken and Young process behind us. Under the conditions of the time, when much cannel was used, it was most successful. When less cannel was used it enabled the best to be made out of a more ordinary class of coal. And generally, it entirely revolutionized current ideas of the day as to the principles upon which condensation should be carried on in order to attain the ends then in view—namely, the production of gas of a high standard of illuminating power, for free-flame combustion.

### NEW PROBLEMS.

New conditions, however, import new requirements; and in the sequel we shall see that Mr. Young was at no time in any way a man of one idea only, and that he kept on steadily increasing his own knowledge and communicating it to his colleagues.

#### Tar-Fog.

In 1878, he closed the series of his papers to the West of Scotland Association by a remarkable paper on some of the physico-chemical laws relating to gases. A portion of this paper deals with condensation or precipitation by impact. He directed attention to the foggy condition to which sudden cooling reduces tar vapours, and compares it to a drifting mist on a misty day, where the droplets are collected by hedgerows, men's whiskers, and so forth. He referred to the plans which had formerly been tried in order to filter this mist out of the gas—the old breeze-box, the dry scrubbers with coke or brushwood, and Mr. Aitken's mode of filtering through wire gauze wetted with oils; and he drew attention to the method applied in Pelouze and Audouin's separator, which, he said, ought to be better known—namely, that of impact. He showed that a slow impact was not at all effective, but that a rapid blow was necessary in order to make the tar particle adhere. The reason for this appeared to him to be that each tar particle was surrounded by a skin of gaseous molecules; that the skin was elastic; and that the skin needs to be positively broken by the impact before the tar inside can stick to the wall at all. One may pause here to observe that this kind of picture of the tar particle is entirely in accord with present-day explanations of the electrification of air by splashing of water. But then, Mr. Young went on to point out, the sudden cooling which brought down the tar-fog has charged the tar particles with light hydrocarbons; and to prevent this it is only necessary to treat the gas in this way while hot, or to make the tar particles impinge on a heated surface. This could be effected by substituting a suitable apparatus for the hydraulic seal, and working direct from the stand-pipe. This would utilize the pressure, and would also prevent pulsations within the retort. These latter, due to bubbling in the hydraulic seal, Mr. Young had found [N.B.A.G.M. paper, 1877] to be a fertile cause of deposition of carbon in the retort. Testing this suggestion experimentally, Mr. Young had found it to lead to success, after introducing a valve arrangement and driving the gas forward in thin sheets or films instead of in small streams. The end was thereby attained without any sooty tar closing up any orifices; and Mr. Young described two patterns of apparatus which realized this improvement.

In a paper of 1880, before the North British Association, Mr. Young resumes the subject of tar-fog in condensation. He remarks that the Aitken analyzer works well in this respect if it be large enough. Experiment shows that a tar-foggy gas clears itself in a few minutes at 150°, where it will not do so in a long time at 40°. The reasons for this are probably that the tar particles are relatively heavier in the hotter gases, and that they themselves coalesce more rapidly, not only through being more briskly agitated by heat but through being drier. If tar-foggy gas be sent through a horizontal tube slowly, while warmed, the fog is deposited; if rapidly, not. If it be sent downwards through a vertical tube, it carries the fog with it; if upwards, it buoys the particles up. So that with vertical currents, either up or down, there is very little precipitation. Horizontal condensers would promote precipitation, but mostly the current would be too rapid to allow this. A large settling chamber would demand a fall of tar particles through a considerable vertical distance, and a very large vessel indeed would be required in order to allow the gas time enough for clearing up. Dividing the distance of the vertical fall by interposing shelves, as in an analyzer, will work very well experimentally.

#### Solids and Gases.

In the same address Mr. Young showed a series of experiments to demonstrate that solid dry naphthalene (on sawdust) has no solvent action on illuminating hydrocarbons in coal gas; that tar oil has; that $CS_2$ (liquid) has; that dry sulphur does not dissolve $CS_2$ out of gas; that waste shale gases condensate does; that $CaH_2S_2$ does not (or very slowly does) dissolve $CS_2$ out of gas; but that the same, wetted with waste shale gases hydrocarbon, very promptly does. The question then is, why do the solids not absorb? Apparently because the molecules of the solid are so far unfree that they cannot take up from the gaseous molecules,

by resonance, the molecular movement which will enable them to assume the liquid forms; whereas, if the other partner be in the liquid form instead of the gaseous, the molecules of the other partner can act upon them, so that liquid $CS_2$ can dissolve solid sulphur. Be that as it may, we know that naphthalene, once deposited, needs liquid hydrocarbon to remove it, that dry sulphur in the purifying boxes does not absorb $CS_2$, that dry lime does not absorb either $CO_2$ or $H_2S$.

Mr. Young then proceeded to explain a scrubber-washer carburettor, in which water and shale gas hydrocarbon liquid were used in alternate trays, through which the gas ascended under floating caps, beneath the edges of which they bubbled through the liquid in the tray. An automatic float arrangement controlled the supply of liquid so as to ensure the liquid coming off of a determinate specific gravity.

### Purification by Ammonia.

About this time Mr. Young was very much occupied with the fractional distillation of coal and shale and the recovery of nitrogen from coke in the form of ammonia, on which he read papers to the North British Association in 1882 and 1883. For any further reference to condensation we have to move forward to the year 1887, in which year he read a paper to the North British Association on "Purification in Closed Vessels and the Avoidance of Nuisance in the Manufacture of Coal Gas." This is a very practical paper dealing with a large number of points. The main theme is that, assuming the then new methods of carbonization and steaming be adopted, so as very largely to increase the yield of ammonia, then this ammonia can be used in closed vessels, along with hydrocarbons from the coal carbonized, for purifying the gas from $CO_2$, $H_2S$, $CS_2$, and other sulphur compounds; and material may be saved by getting the liquids to dissolve the gases under pressure, which would also enhance the effect by permitting higher temperatures to be used. In this case the conditions are such that you are not to apply the counter-current principle to the revivified liquor and the crude gas.

### Particular Hydrocarbons in Condensation.

In the course of this paper Mr. Young introduced a brief study, not of the behaviour of "light hydrocarbons" as a whole, but of particular hydrocarbons during condensation.

We know how light hydrocarbons come to be in the coal-tar naphtha; and we know that the gas can take up coal-tar naphtha in the absence of the tars or of heavy oils. But suppose we take coal-tar naphtha which has been deprived of its benzol, and present this to coal gas in the presence of heavy oils. What happens then? The result is that the oils take away that particular missing constituent, the benzol, from the gas; not the whole of it, but enough to restore a balance between the benzol in the gas and the benzol in the liquid, and between these and all the other constituents present. Then, generally, if the naphtha is rich in benzol, so is the gas; if the liquor is rich in ammonia, so is the gas; and so for every other constituent. And, on the other hand, if we want to withdraw from the gas some particular constituent, we add material deprived of that particular constituent, of which it will take to itself its full share. Thus we may take naphtha denuded of sulphur compounds and turn it into the gas in the form of vapour. When it condenses out again it will have taken to itself nearly all the sulphur compounds in the gas. If we use it liquid and in conjunction with a solution of $NH_4HS$ the naphtha will act as a carrier, and will hand $CS_2$ over to the $NH_4HS$ to form $NH_4HCS_3$; and it will go on with this until the supply of $CS_2$ from the gas is exhausted. Such a method seems to be quite practicable.

### Condensation and the Peebles Oil-Gas Process.

The next period of Mr. Young's activity was devoted partly to shale oil and ammonia recovery, partly to the scrubbing out of valuable constituents from blast-furnace gases and the like, and largely to the cracking-up of oils for the enrichment of coal gas in the Peebles oil-gas process. Six years went by without his producing a communication to the Association; but in the meantime, in 1892, the North British Association showed its recognition of him by making him an Honorary Member, a distinction which I recollect gave him the deepest pleasure.

In the following year, 1893, he read a paper to the North British Association upon the Peebles oil-gas process, in the course of which he said that, as regards condensation, the principles of the earlier papers had been applied in this process. The condensation was so regulated that the oils were allowed to remove from the gas all the hydrocarbons which would not bear distribution; for this end the condensation was fractional and the gas went out perfectly gaseous. In 1894, he contributed another paper to the North British Association on further developments of the Peebles process, and in 1895 he read to the Association a most luminous paper on "The Chemical Constitution of Illuminating Gas and its Illuminating Value, and the Laws affecting Luminosity." This was, in my view of it, a paper of which the Association may well be proud; but, unfortunately, his reading of it was the occasion of his last personal appearance before the North British Association or before any other. Ill-health pursued him; and he found the tranquillity of his home, on the banks of his beloved Tweed, to suit him best. But his mind was active and stored with observation and practical experience, and his pen was busy; and in the next year, 1896, he sent the North British Association another paper on "The Permanency of Illuminating Gas," a question to the importance of which the new oil-gas processes had drawn attention. This subject he dealt with in a spirit of keen scientific analysis.

### Vapour-Tensions and Permanence.

The vapour tension and the dew-point of a simple vapour correspond, but a mixed hydrocarbon vapour has a vapour tension of its own, a "combined vapour tension" which is the pressure which must be applied in order to start condensation. If this be less than the atmospheric pressure, the mixture of vapours is not "permanent;" if it be greater, it is; and if it remain greater at the lowest temperature it may encounter, it is "permanent" in the gas-maker's sense. This "combined vapour tension" depends upon the temperature and upon the mutual solvent affinities of the gases and hydrocarbons. These solvent affinities keep things in the gas which, by themselves or in the presence of merely inert gases, would have partly condensed out, and when condensation begins things condense out which otherwise would not have done so.

In the early experiments which led up to the Aitken and Young process, the combined vapour tension of commingled liquid hydrocarbons was found to be only about the mean of them separately, and varied with the proportions of each. On distillation of commingled liquid hydrocarbons the constituents came off simultaneously in varying proportions, which depended on the boiling point of each and the proportion of each in the liquid.

In practical working the Aitken and Young gas, though permanent at ordinary temperatures, still gave up hydrocarbons to the oil of the leathers of gas-meters, and the tars were therefore called in to reduce the proportion of hydrocarbons in the gas.

The early experiments showed that the permanency of a gas depended on the treatment it receives during condensation; and the carbonization must be so controlled that there is neither an excess of pitch and naphthalene nor an excess of light hydrocarbons, so that the mode of carbonization or, in oil-gas processes, the mode of cracking-up of the oil, as well as the washing, affects the permanence. In tar-fog the scantier the tars are, the less easily will they coalesce and settle down.

Take a mixture of hydrocarbon vapours, under a pressure equal to its "combined vapour tension," and no more; then add another hydrocarbon. Unless the vapour tension of this is high (that is, unless it be a very volatile hydrocarbon), it will tend to cause precipitation of some of the denser vapours already in the gas.

There is an idea afloat to the contrary that it might raise the vapour tension of the hydrocarbons in the gas, particularly of the naphthalene. This may possibly be true with regard to naphthalene, for naphthalene passes directly from the vapour to the solid state, and thus loses its solvent affinity for vapours and gases. It may be that the condition of naphthalene in the gaseous state may be in some way different; but "I am afraid that the high enriching results that have been obtained . . . have been due not directly to the true diffusion of naphthalene vapours through the gas, but to the presence of enriching hydrocarbon vapours. The presence of these vapours would lead, at higher temperatures, to the naphthalene being taken up in a diffused condition, again to be deposited as solid naphthalene on the temperature falling, but in such an extremely fine state of division that it is carried forward with the gas." The vapours of hydrocarbons (in quantities far short of saturation) do not prevent naphthalene deposits during distribution.

Commercially, Mr. Young pointed out, we ought never to have to send out a gas too rich in order that when it reaches the consumer it may have a proper value.

## CONDENSATION IN THE DAY OF NAPHTHALENE TROUBLE.

Here we get the echoes of the naphthalene trouble beginning to sound in our ears. Circumstances were changing. Are we then to figure Mr. Young to ourselves as isolating himself from the problems of the passing day and mumbling the remainder biscuit of an effete system of condensation? Not by any manner of means. He was wide awake to the problems of the time, as is shown by the addresses he subsequently prepared, and the various other products of his pen, and he retained the openest of open minds to the last.

At this period we may say that illuminating power in open flames was still the main thing aimed at; that very high illuminating power was not thought of as much consequence as it had been; that it had become important to secure larger yields as regards the volume of gas produced per ton; that for this purpose higher heats than previously had become habitually used; that with this exception the methods of carbonization had remained much as before, the retorts used being still horizontal or inclined; that the high heats had resulted in larger volumes of gas of a quality which mostly needed enrichment, if the old standard of illuminating power was to be maintained; that it was on the whole of advantage to go to the cost and the trouble of carrying out this enrichment; but that there was one serious drawback to the use of the higher heats—namely, the presence of naphthalene in large proportions in the products of carbonization, and its deposition in a most inconvenient form at the most inconvenient points. Mr. Young took up the consideration of this naphthalene trouble and expended a great deal of thought upon it. One of his contributions to the question was in a paper by himself and Mr. Thomas Glover, read by the latter before the Gas Institute in 1897.

### Young and Glover.

In this paper the high heats which had come into ordinary use were referred to as establishing a balance between a sufficiency of

carburetting hydrocarbons to be carried forward with the gas, and a sufficiency of condensable hydrocarbons to come down and prevent choking of the apparatus with a sooty pitch, all this being subject to the condition that the condensates must not remove the carburetting hydrocarbons. Now, the peculiarity of the results under the high heats was there was a great gap in the series of products; the paraffins, with the exception of $CH_4$, were mostly absent. Cresoles, high olefines, and higher benzols were comparatively scanty, and benzol and naphthalene stood out among the products. All this made it impossible, Mr. Young pointed out, to carry out fractional condensation. The naphthalene tended to come down in a solid form, in the absence of the higher benzols, the cresoles, &c., which would have condensed into liquids along with it and washed it down into the tars; and, further, the gas went on perfectly saturated with naphthalene and, more than that, contained solid naphthalene in the form of a floating dust. Adding cannel to the coal did some good, in providing a supply of those hydrocarbons which were capable of condensing along with the naphthalene, and washing it down; but a practice of condensation had come in, in which the earlier type was reverted to, and the condensates were allowed the fullest opportunity of taking as much naphthalene as possible out of the gas. Naturally, they at the same time robbed the gas of illuminating hydrocarbons; but these could be recovered, and enrichment was resorted to in order to make up any loss.

The illuminating hydrocarbons in the gas were too remote from the naphthalene, as regards their vapour tension, to affect its condensation. It precipitated as a solid even in their presence. And they had no effect (perhaps if the writer were asked he would say no practical effect worth taking notice of) in the way of acting as solvents and keeping naphthalene up in the gas. The deposition of naphthalene as a solid and, later, the deposition of condensates as liquids are quite independent of one another.

In the paper it is suggested that the coal should be distilled in two portions; one at high heats to make bulk, one at low heats to make hydrocarbons, which will bring down the naphthalene in liquid form, and also may, to some extent, go towards enriching the gas. As alternatives we might have water gas, on the one hand, and on the other a purchased oil used in a scrubber. This would take out the naphthalene in the same way as water takes out ammonia, and the naphthalene may be frozen out of it and removed by a press filter. If benzol be added to the washing oil beforehand, the benzolized oil will allow the benzol of the gas to pass, and will absorb the naphthalene only. The washing might be carried out with the earlier portions of tar distillate. If, instead of using liquid hydrocarbons for scrubbing, we charge the gas with vapours of the required hydrocarbons, then, when these condense out, they carry the naphthalene out in a liquid form. But if too much of them be used in this way, they unduly affect the illuminating power through their solvent effect.

Mr. Young was not able to be present at the meeting, and Mr. Glover indicated that Mr. Young would answer questions as to his proposition that hydrocarbons in the gas had no solvent action upon the naphthalene in the condensate. Mr. Young sent a subsequent communication to the Institute, which appears in their "Transactions" for the year 1897, defending this as a general proposition applicable to all vapours and all condensates. He was probably mistaken in this as a general proposition, and had stated the matter correctly in his paper of the previous year. The writer recollects challenging him about it as a general proposition, universally applicable; and Mr. Young does not appear to have adhered to it as such. No doubt, on the other hand, it does express for practical purposes the facts of the case as regards naphthalene. In this communication Mr. Young made the interesting observation that when a gas containing naphthalene and illuminating hydrocarbons is continuously passed through dead-oils, a time comes when there is no apparent effect upon the illuminating power; it seems as if the dead-oil had become saturated with what it could extract from the gas. Nevertheless, there was a difference. The dead-oil went on absorbing naphthalene, and losing some of the light hydrocarbons it had previously taken up; and in this way an equilibrium of vapour tension is kept up. In the end, the oil becomes unable to absorb any more naphthalene.

### Fractional Condensation Obsolete.

Three years later, in 1900, Mr. Young presented another paper to the Gas Institute on "Naphthalene from the Retort to the Point of Deposition." In this paper Mr. Young, after comparing the opposed tendencies—to solution in liquid and to diffusion through gases—manifested during condensation, gave a historical *résumé* of the different ideas which had prevailed as to condensation, and pointed out that in any case the separations are not quantitative. He also compared the distillation of tar with the process of condensation by which the tar is formed, and said that, whereas we might expect the one process to be the exact reverse of the other, this could only be the case if we could have perfect fractional condensation and continuous removal of the products. In practice it is impossible to attain this, either in distillation or in condensation; so that it is impossible to separate two liquids by one distillation or condensation. Reverting to the principles of the Aitken and Young process, he said such processes had their advantages at their date, but the advantages were questionable with high retort heats and excessive quantities of naphthalene in the products. The recent English experience was that there was more trouble with naphthalene when the Aitken and Young principles were applied than when the older plan of sudden cooling was adopted. The explanation of this is, after all, quite simple. The fractional condensation restricts the solvent affinity of the tars for the vapours of hydrocarbons more volatile than the tars; and naphthalene vapour itself is one of these. The gas while hot, therefore, contains much naphthalene; and as the gas cools down the naphthalene is deposited in the cool end of the condenser. It comes down solid for lack of the appropriate accompanying hydrocarbons. As the gas passes over this deposit it may add to it or it may take from it, according to the local temperature, but in any case the gas goes on, after contact with the deposit, saturated with naphthalene. The position of the naphthalene deposit may therefore fluctuate; that of the tar deposit may do the same; they may even overlap. And Mr. Carpenter very ingeniously makes them overlap by reversing the direction of the gas stream from time to time; so that tars are deposited on naphthalene, and wash it out. Sudden cooling, again, produces tar-fog, and tar-fog either dissolves naphthalene out of the gas directly or, later on, interferes with its assuming a crystalline form. This tends to steady the amount of naphthalene left in the gas, whereas fractional condensation exposes it to fluctuations on account of variations in the temperature of the gas passing over the deposit of naphthalene in the condenser. Sudden cooling, on the other hand, makes the tar-fog dissolve out some benzols from the gas; but the whole quantity of benzols in the gas is so far from saturating it, that a very small quantity of benzol removed from the gas is sufficient to establish an equilibrium.

Under the conditions in question, therefore, the liquid tars ought to be precipitated out and also kept in contact with the gas until the whole is comparatively cold; and for the removal of such naphthalene as still remains in the gas we ought either (1) to wash it out, say, with dense oils from the condenser tars, freed from naphthalene, but with an addition of benzol, or (2) to let into the gas the vapours of liquid hydrocarbons of approximately the same vapour tension as naphthalene, and to condense these and the naphthalene out together, in liquid form. Under (1) if we add an excess of benzol we not only prevent deterioration, but positively enrich the gas; and under (2) it may be noted that cannel coal carbonized at low temperatures gives products which have a very high solvent power for naphthalene, while, as to enrichment, the value is twice as great as when the same cannel is carbonized along with ordinary gas coals.

In 1900, Mr. Young sent to the North British Association a comprehensive and suggestive paper on "The Principles involved in the Production of Gas by Different Processes and their Relative Values." In this paper he discussed the various uses of coke in gas manufacture, the processes of destructive distillation, and the question how gas should be tested, and what is the best gas to supply under modern conditions. Under the second of these heads he showed how the old Aitken and Young process, with its use of water gas or poor gas, protected the hydrocarbons from decomposition, and threw light upon what happens within the retorts; for within these we may for a considerable length of time have simultaneous or overlapping production of richer gases from one part of the charge and of poorer gases from a more spent region.

### Self-Contained Condensation.

In 1902, a paper under the joint names of Mr. Young and Mr. Thomas Glover, based, according to Mr. Glover, on Mr. Young's notes, was read before the Southern Association. The subject was "Further Suggestions for the Elimination of Naphthalene from Coal Gas," and the problem for which a solution was offered was how to apply the principles of the 1900 paper without having recourse to the tar distiller for the necessary washing oils. In this paper the writers discuss the conditions to be met. Colman and Carpenter have emphasized the important part played by solvents in the removal of naphthalene, and the fact that the condensable solvents are insufficient to dissolve out all the naphthalene made in modern practice; the gas can carry more naphthalene than it formerly could have done, because there is now a greater gap than there formerly was between the saturation point of the gases and that of the tars. However prolonged may be the contact between the tars and the gas, the tars cannot remove more than a limited amount of light hydrocarbons from the gas—not exceeding, say, one-quarter gallon per ton of coal; the tars contain 2 lbs. of naphthalene per gallon, and even pure gas led over this takes up naphthalene in diffusion. The conclusion is that even if the gas and the tar are kept in contact throughout during cooling, the gas will still contain naphthalene under modern conditions, and we must do something more efficient than anything we can do by applying the solvent action of hydrocarbons in condensation by present methods. If we are to operate the removal of naphthalene entirely within the gas-works without the aid of solvent from the tar distiller, we must modify our methods of condensation in some way.

The suggestion made in the paper was, briefly, the following: Collect the denser tars while warm, and endeavour to keep the lighter hydrocarbons in the gas. This latter aim is achieved by (1) collecting the tars from the foul main while hot, and using a tar extractor or a Colman separator on the foul main to treat the gas; (2) passing the hot tars to a cooling and settling tank; and (3) using the cold tar to wash the gas, the hot gas and the cold tar being made to flow in opposite directions.

The cold tar has had the bulk of its naphthalene deposited, and has practically a full solvent value, and it exerts in the counter-current a full cooling and washing effect and removes any naph-

thalene deposited. The tars, as they warm up in the counter-current, give up any light illuminants they may carry, but are not heated-up sufficiently to make them throw off naphthalene. The temperature of the tars could be kept under control to suit the results required.

It was not suggested that very dense tars, approaching pitch, would be suitable; but hot precipitation of tars may thus give a suitable material from the gas itself.

### MR. YOUNG'S LAST ASSOCIATION PAPER.

Mr. Young's last paper to an Association was that sent by him, appropriately, to the North British Association in 1903, entitled "Remarks upon the Principles Involved in the Production of Gases from Coal, and Suggestions as to their Application in Future Developments." This paper has no special bearing on the problems of condensation; it is directed to the possibilities of the then future in the management of carbonization so as to produce much ammonia, a large volume of gas in which the principal value would lie primarily in the heating power, and in the utilization, towards such enrichment as might be needful, of the tars obtained. These things all pertain to the region of carbonization, which is in the able hands of Dr. Colman. But we may observe here that this, the last paper of a long series, shows all the earnest intentness of the early papers, the same youthful grasp of the possibilities of the future, with the added breadth of view derived from ripe experience. The ideals and aims of his earlier days, the production of good gas for flame illumination, were all being displaced by newer requirements and conditions; but for the future he saw that there remained for the gas industry a Promised Land of extended usefulness, and surveyed it as from a Pisgah top.

During the brief remainder of his life Mr. Young managed to show a youthful ardour of spirit struggling with ill-health of body. His contributions on various questions of interest to the gas industry—particularly in reference to carbonization—were during this period both numerous and interesting, and will be found indexed in the appendix. Here we find a notable survey of the whole field of vertical-retort working, illustrated by the experience of forty years in both shale oil and gas manufacture. But into this field we do not enter here.

As regards condensation, we may here note that Mr. Young points out that his own early process for the extraction of hydrocarbons from waste shale gases had of late years been identically used for recovering benzols from coke, oven, and other gases.

### HIS SUBSEQUENT WRITINGS.

During this last period of his life, also, the removal of naphthalene was very much in Mr. Young's thoughts, and in the thoughts of others too. A crop of new methods appeared, to which it is needless to refer in detail. But the claims made for them brought Mr. Young out swinging his cudgels, averring, and, apparently, proving, that all these in which there was any success were mere special cases of the application of the principles of the Young and Glover patent, which applied the principles set forth in the papers of 1897 and 1900 above referred to. Retrospectively, he said the Young and Glover work had its origin in the circumstance that at St. Helens, where they used high heats in the retorts and enriched the product by means of the Peebles oil-gas process, the presence of these light oil vapours in the gas had no effect whatever in preventing the deposition of naphthalene in the crystalline form. The tars had become cracked-up, yielding naphthalene and some extra gas; the loss of liquid tars had resulted in a deficiency of suitable solvent for the naphthalene; light hydrocarbons had no useful solvent action in the gas, keeping the naphthalene up in the gas; the suitable solvents must be supplied as a supplement, either in washing-out the naphthalene or in being added to the gas as vapours, and subsequently being condensed out, carrying the naphthalene down with them in liquid form; and the absence of lighter hydrocarbons in the supplementary solvent might result in the temporary impoverishment of the gas, or, on the other hand, their presence might result in preventing impoverishment or even in enrichment of the gas. When the supplementary solvent was saturated with lighter hydrocarbons, its absorbent action was confined to the naphthalene. A large range of possible solvents was therefore indicated, according to the object in view, so long as they contained proper solvents for naphthalene which would either wash it out or make it come down in liquid form on condensation; and the particular solvents suggested by various workers in the field all came under this general category. And, further, the origin of these solvents might be different, so long as they met this condition. The use of light oils was disclaimed in the patent specification.

The St. Helens experience and the inquiries consequent upon it had put an end to any belief that light hydrocarbons and naphthalene, present together in gas, had any mutual solvent action; but they were entirely in accord with certain experiences of thirty years before in the working of the old Aitken and Young condensation process. This process had been found to be unworkable with gas from Newcastle coal. The fractional condensation had loaded the gas not only with illuminating hydrocarbons, but also with naphthalene, and restricting the operation of the process was of no good, since allowing the naphthalene to remain in the tar resulted n the illuminating hydrocarbons also remaining in it.

Naphthalene elimination processes present a difficulty as regards testing them. There is no very simple test for the quantity of naphthalene present in gas; even Dr. Colman's requires considerable skill; and the immediate working results depend enormously upon previous accumulations of naphthalene in the mains, &c., and upon the drift of these under varying conditions of temperature. But where the gases have been mixed with the vapours of the special solvents, the troubles in the mains much sooner disappear than when we simply wash the naphthalene out of the gas. If persistently applied, the Young and Glover method will, Mr. Young says, "on whatever reputation I may possess, prove a perfect remedy for the worst naphthalene plagued distributing system in the country."

A little later Mr. Young, with his ever-fresh mind and open outlook, points out a new source of the naphthalene trouble—none other than his own cherished radiant heat. He had found that radiant heat of a high temperature has a selective power of destroying the very solvents which are required to prevent naphthalene depositing in the crystalline form—these being the toluol, xylol, cumol, &c., and the phenol, cresol, &c.; and the products of the action of the radiant heat upon these are naphthalene, benzol, $CH_4$, H, and small quantities of CO. The naphthalene trouble is therefore promoted with high heats by using relatively small charges or relatively large retorts, and this may help to account for the discrepant results obtained in different works from the same coal.

On this ground Mr. Young at once welcomed the appearance of Bueb vertical retorts, with their full charges. He at once said that such a process ought to be practically free from naphthalene, even where the temperatures are extremely high, but that the gas would probably be comparatively poor in heating and illuminating power, as compared with the gas made in retorts, at lower heats, with a free space above the charge.

But where naphthalene is present, Mr. Young found himself able to comment very favourably on Mr. Browne's drastic and sudden cooling, in the absence of the required solvents in sufficient quantity to work a counter-current condensation without supplementary oils. The underlying principle is the same as that of Mr. Young's Institute paper of 1900, to make the less volatile condensed tars to serve as a solvent; and where the cooling is quite sudden, as in water-tube condensers, the new method may be the best method of applying the principle. Atmospheric condensers, on the other hand, remove the tars while they are still warm, so that these tars do not abstract the naphthalene.

The Aitken and Young process was, from its nature, adapted to high-grade gas; and very early experiments had shown that the lower the grade of gas the less was the benefit derived from the application of the counter-current principle, until, at the lowest grade, there was no gain whatever, and there was, on the other hand, no loss if the tars and the gas were kept together down to a temperature from 65° to 60° Fahr. It is quite possible, therefore, on any system in which tars and low-grade gases run together, to ascertain to what temperature it is possible to cool them before deterioration of the gases begins to set in. This having been ascertained, the remaining question would be how to keep the gases and tars in contact with one another until they do reach the temperature? We have Mr. Carpenter's alternating method, and as an alternative to this we might have a continuous method, as follows: (1) Send cold gas from the condensers into the hot products from the retorts, and thus precipitate tar-fog in the latter; (1*a*) if of advantage, also spray cold tars from the condenser into the hot products from the retort; (2) send the foggy mixture forward through the condenser until cooled down to the determinate temperature; and (3) separate the tar by a tar extractor. The details of the suggested method would vary according to the conditions of the working, but it would present an alternative way of applying the principles underlying the Young and Glover process.

All this illustrates the open-mindedness of Mr. Young to the end. He had revolutionized condensation and had shown that the ancient ways were wrong as applied to the high-grade gas of the period. But time went on, conditions altered, low-grade gas came in; and under these altered conditions Mr. Young was prompt not only in admitting that the ancient ways might now be the best, but in showing how they could be modified so as to become still better.

A very brief reference may be permitted to Mr. Young's last papers, which were published very nearly two years after his death. They were upon "Gasification of Coal in the Producer," and "Purification of the Resulting Gases."* The former of these is a very sweeping paper of suggestions as to the future of carbonization, and the latter is a development in very simple terms of Mr. Young's early ideas, in his patent of 1881 (which anticipated Claus, but was far simpler in its working) and his patent of 1885 (the use of pressure), for the purification of gas by means of the ammonia contained in the products, used over and over. Mr. Young's faith in the possibility of purifying the gas by means of ammonia never faltered, and in this his last message to the gas industry he pointed out once more the path which should be pursued, with suggestions as to the best possible applications of regeneration and the best utilization of the heat employed.

### THE ROMANCE OF IT.

Now, readers mine, we have traced the story of condensation from its small beginnings to the close of Mr. Young's life. I do not know how it may strike you, or whether indeed I may have been able to keep your interest alive thus far; but to me the story, in its gradual unfolding, and its increasing sense of grip

* These papers appeared, in the form of "Communicated Articles" to the "JOURNAL," Vol. CV., pp. 17, 87.—ED. J.G.L.

and mastery, seems to present all the interest of a scientific or technological romance. Observe from what a trivial origin the whole thing grew. Mr. Cusiter's oil, unexpectedly spoiling the illuminating power of a gas-flame away back in the sixties, was not much more complex an object of contemplation than James Watt's mother's kettle was. But the one attracted the attention of a James Watt; the other attracted the attention of a William Young. Many a one might have seen such a phenomenon, but Mr. Young saw into it, saw through it, saw all round it, and he kept on seeing, off and on, for forty years, never ceasing to learn, never wearying in continued observation, in reflection, in experimental work, in practical application to varied and sometimes to diametrically opposed ends, and in adapting the principles which experience had taught him to the ever-changing requirements which changes in the current utilities and purposes of gas and in the mode of its manufacture brought successively in their train. Mr. Young was emphatically not a one-ideaed man; he took delight in the fact that new conditions brought new problems, and that new problems called for new solutions; and when the over-abundance of naphthalene in the more modern gas upset all his special work in fractional condensation, we, having known Mr. Young, can understand him and enter into his feelings when he tells us that his "labours in connection with the evolution of the solution of the naphthalene problem were labours for the love of the subject, a recreation, a pleasure, and were not undertaken with the object of the pecuniary gain they might possibly bring to me." That rings true. Mr. Young was always very pleased when the work led to some reward, and the handsomer the reward, why, of course, so much the better; but I have always been under the impression—and, being his junior counsel, I had some opportunities of forming an opinion—that he might have made a great deal more money if he had been more grasping and pugnacious. That, however, was not his line, nor his conception of life. His true delight was in the work itself; and as he was of the temperament described as "contented wi' little an' canty wi' mair," and was something more than comfortable in his circumstances in a quiet way. Through the fruits of the work done by him up to the age of forty or forty-one, he was happily enabled to devote himself to the work he loved until ill-health came upon him and hampered him seriously. But even then, in spite of ill-health, he was so interested in the work that his industry was indomitable, and his papers gained in power and breadth with each flight.

The papers on condensation seem to me well to illustrate the consecutively progressive nature of Mr. Young's work. For any given set of conditions the solution of the problem was always complete, comprehensive, and well rounded off; but to Mr. Young that never meant that he had reached finality, and his mind was ever fresh.

## POINTS OTHER THAN CONDENSATION.

Space fails me, I am sorry to feel. I would like to invite my readers to consider Mr. Young's work and his method of working in other departments than that of condensation. But limits of space restrict me to a few imperfect observations merely.

Look for a moment on Mr. Young's work on radiant heat. He saw that a free space above the charge brought about good results in coal retorting and bad results in shale oil distilling; and he traced this out until he found that these abnormalities were due to a selective action of radiant heat acting within the free space, and found a physical reason for this selective action. Later, he turned this selective action to account in the Peebles oil process; and later still he traced part of the naphthalene trouble to an undesirable effect of this selective action, and was prepared to welcome the principle of the Dessau working, where such action is excluded.

Or take again his painstaking and thorough work in the recovery of nitrogen from coal or coke or shale subjected to carbonization, work which, along with the rest of his work on shale oil manufacture, may be said to have saved the Scotch shale oil industry from decay, and which may yet have a great future before it in the gas industry.

Or take his investigations into the purification of gases in closed vessels by ammonia, and his ingenious methods of rendering this easier and more effective by subjecting the gases to pressure. It may be that nothing has yet come of this in practice, but Mr. Young stedfastly regarded it as very practicable, and something is sure, one would say, to come of it in the future.

Or take those far-seeing and suggestive papers of Mr. Young's upon the illuminating power of flames and the relation between this and the chemical constitution of the gas, or his ingenious tracing out of the effect of pulsations in the retort, due to bubbling in the hydraulic seal, as a potent factor in the deposition of carbon as graphite in retorts.

## CARBONIZATION.

Any account of Mr. Young's lifework would be necessarily incomplete which failed to give at least a full summary of his work on carbonization. This sketch does not profess to be exhaustive as regards Mr. Young's whole lifework; it has been typically illustrative merely. The subject of carbonization, including the cracking-up of oils, as it presented itself to Mr. Young at different stages during his lifework, is one which will repay the most careful study. We are to learn something about it, especially in its more modern aspects, from the inaugural lecture of the series; and in relation to vertical retorts, the course of Mr. Young's thought and work, from the early days onwards, has been most interestingly reviewed by himself in the series of five articles on vertical retorts which he contributed to the "JOURNAL OF GAS LIGHTING" not long before his death, and which will be found noted in the index. Let me urge upon my readers first to make a study of these five articles, and then, with the aid of the index given below, to go back to the beginning; to read all Mr. Young's contributions on distillation in chronological order; and to saturate their minds with Mr. Young's principles and his methods of thought and work. I can assure them they will not lose their pains. Any one who will follow up Mr. Young's utterances with regard to any of the subjects with which he dealt, will find him to be always the same sleuth-hound, patiently but perseveringly following the trail, passing by the unessential, instinctively avoiding the erroneous, so that it becomes a real intellectual treat to watch him at his work in its successive stages.

## MR. YOUNG'S SCIENTIFIC INSIGHT.

But we can go still farther in company with Mr. Young. We can feel that he had a real scientific insight. Personally he was very modest, and he kept his own intuitions very much out of his published papers. Still, here and there they crop out. His conclusion that there must be an elastic skin film of gas molecules covering the particles of tar in a tar-fog dates from over thirty years ago, but is completely modern in its style; and his idea that white light, as distinguished from coloured light, is due to explosive flashes from disintegrating molecules, is one of the newest things out at the present moment, and in one form or another is shifting the foundations of the theory of light.

Of much that Mr. Young knew and thought there is, however, no record. It is only those who had the privilege of knowing Mr. Young and of being able to discuss the problems of Nature up and down with him who can be really able to judge the depths of his scientific insight and the width of his scientific knowledge. As a student of Nature, I think he was very much the type of man that Michael Faraday was, with the same humility of personal bearing towards the foundation truths which he always earnestly desired to understand, and with the same mental power of vividly visualizing his conceptions. He had the same defect as Faraday, too—the want of the mathematical turn of mind. But he had Faraday's great gift—the gift of clear and interesting exposition; he made you see clearly what it was that he clearly saw in his own mind. And when he was roused to explain things to you as he saw them, I have often been struck by the exceeding likeness of his bearing and expression to those of James Clerk Maxwell—the same intentness, the same kindling of the eye, the same swing back of the head, the same obvious desire to understand the "go of things," and in its degree the same instinctive direct rightness of thought, and, may I add, the same sense of humour and the same candour and limpid sincerity of character.

The natural tendency of Mr. Young's mind was what Buckle says, in his "History of Civilisation," is the distinctive tendency of the typical Scottish investigator, to use the deductive as against the inductive method—that is, not to try a lot of things and see what happens, but to marshal the existing knowledge, to think it well out, to conclude that probably the best method would be so and so, and then to see how it works. This method requires a fulness of knowledge, and that a real and practical knowledge. But this Mr. Young possessed. His atoms and hydrocarbon molecules had become, as it were, personal friends of his own; he knew their ways and could play upon their idiosyncrasies, and guide them to do what he wanted them to do for him.

Mr. Young was thus what we may well call an intensely practical man with an intensely scientific mind. The merely "practical man," he certainly was not; if he had been such, and such only, it may safely be said there would have been no William Young Memorial Lectureship. The merely practical man was defined by Lord Beaconsfield as the man who practises the errors of his forefathers. The "experienced practitioner" I have heard the late Dr. Matthews Duncan describe as a man who had done the thing fifty times the wrong way. Mr. Young himself, in urging the necessity of technical instruction, dismissed the merely practical man, not without a touch of kindly pity, as an "imitative animal," helpless in the presence of new conditions. The purely scientific man, on the other hand, is apt to find himself out of touch with practical requirements; and, though it all comes right in the end (for in the multitude of researchers and of inventors there is safety), there does seem to be a waste of time where we have not the practical mind brought immediately to bear upon the results of scientific research, or even guiding the course which this should take. Lord Kelvin was none the worse as a scientific researcher for having a keen eye to practical applications; on the contrary, these gave vividness to his conceptions, and in many cases made the solution of his problems a matter of urgency—thus preventing the consumption of time in following up side issues. On the other hand, the writer has always maintained that the phonograph ought to have been invented long before it was; the principles of it were clearly understood before, and the application of these in concrete form was to hand all the time, but the practical inventor had not, as the phrase goes, "happened along." The scientific man who makes his individual mark upon science is, however, never very far in spirit from the practical inventor, for he has the power of vividly visualizing his own conceptions, or, rather, his perceptions of the facts and fundamental truths of Nature, along with those of other researchers who have preceded him. It was this power, exercised in the field of knowledge and

inquiry, as well as in that of practical applications, which Mr. Young possessed in so marked a degree.

### HIS EXAMPLE REMAINS.

It may be that we have lost Mr. Young all too soon; that his guidance and his long experience ot what was practically possible at the two extremes of the scale—gas making and shale oil making—would have been of great service in the period of still further change we are now passing through. He himself felt that there was no longer need to address weighty words of counsel and reproof to gas managers on the subject of their own technical attainments, and that there was no fear as to the future of research in the gas industry being well guided. I am happy to think that Mr. Young took occasion to mention your first Memorial Lecturer as one from whom he confidently expected much.

And it may be that as time goes on, as conditions change, as new problems have to be faced and solved, as new methods replace the old, and as those who knew Mr. Young personally drop out of the ranks of active life—it may be perhaps less easy for those who come after us to understand the immense impression produced by Mr. Young during his long life of activity upon those who came in contact with him, or the reasons which have made it seem none other than an act of filial piety to take due steps to keep his name in remembrance. They will not know the outstanding personality, the striking figure, big, erect, strong looking, with muscles taut and faculties all braced-up, hair early white at top, massively rising above a square brow, full beard of dark brown for many a year, but later of patriarchal hue, dark, piercing eyes that looked straight at one and through one, but with a kindly and almost a shy glance, and an unassuming willingness to see all the good that was in one. They will not know his warm hand grasp and his kindly ways; they will not have the privilege of being inspired by the feeling of having come in contact with one of the master minds of our time; they may even lose touch with his personal influence so far as to say, in time to come, that, after all, his record is that of a lifework which was applicable to, and of value only for, old conditions which have passed away. All that may be, but the example of the manly man who rendered such services to the industries of his native country, and indirectly to those of the whole world, who in his sphere so nobly served his day and generation, who bent his mind to his lifework and pursued his labours in the face of ill-health in the spirit of the injunction, "What thy hand findeth to do, do it with thy might;" who cheerfully accepted the consequences of changes in the surrounding conditions even though these might, to a smaller mind, seem vexatiously to bring to nought much of his own previous teaching, laboriously worked out by him, and who for the love of the subject, as a recreation, a pleasure, laboured to meet these changes which he welcomed; who, confident in the glad prospects of a new era of wider utilities for gas manufacture and of wider possibilities therein, devoted his failing days to preparing a parting message of directions and encouragement to the gas industry whose work he loved—such noble example can never die away nor fail to continue to our successors some at least of the stimulus, inspiration, and guidance for which the present generation has been so deeply indebted to William Young, so long at least as the William Young Memorial Lectures shall endure. And may the day never come when the gas industry shall have died out, and the lifework and the example of William Young have become lost to the memory of men.

At setting out upon the duty which the Council of the North British Association entrusted to me, I felt my own inadequacy; I feel it still more now on laying down my pen. The man was so much greater than anything that can be said about him, and he is his own best interpreter. Let me urge all my readers to make a careful study for themselves of the writings and the recorded utterances of Mr. Young, and I can assure them, as I said before, that they will not lose their pains. Even the dissertations in his successive patent specifications are themselves of great interest, as setting forth the state of the art from time to time, the problems which had to be faced, and the solutions which presented themselves to his mind.

In order to assist those who may wish to make the careful study I have recommended, I have added a complete index, or as nearly complete an index as I have been able to make, of all Mr. Young's recorded utterances and published writings on technology. This index was made for the Trustees of William Young; and it is by their kind permission that I am enabled to furnish forth my own inadequate words with this addition, which, I am convinced, should be of abiding interest and value to workers in all parts of the world.

I am informed that in connection with these pages it is proposed to reproduce a photograph [p. 649] of Mr. Young for which I am responsible. There is, I think, more of Mr. Young in this than in any other photograph of him which I happen to have seen. He was at the moment keenly interested in an exposition I had just given him of the difficulties encountered in taking a photograph under the existing conditions of lighting, and I had just shown him on what principles I came to the conclusion that an exposure of as much as seven seconds would be required. He willingly threw himself, full of interest, into the task of sitting still for the required seven seconds; and the result is as you see it. The photograph was taken in his own greenhouse on a bright winter day, and there was ice on the outside of the window-panes.

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## INDEX OF VARIOUS CONTRIBUTIONS TO TECHNOLOGY

By Mr. WILLIAM YOUNG.

1866—1909.

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ABBREVIATIONS.

| | | |
|---|---|---|
| N.B.A.G.M. or N.B.A. | = | North British Association of Gas Managers. |
| N.B.A. *Trans.* | = | Transactions of the North British Association of Gas Managers. |
| W.S.A.G.M. | = | West of Scotland Association of Gas Managers. |
| J.G.L. | = | "Journal of Gas Lighting." |
| G.W. | = | "Gas World." |
| King's Reps. | = | King's "Reports of Gas Associations" (J.G.L. Office, annually). |

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| | 17 Sept. | „ 2380/66; Peter Brash and Wm. Young. | Oil from shale, &c. | „ „ |
| 1867 | 3 March. | „ 650/67; Wm. Young and Peter Brash. | Distillation of bituminous substances. | „ „ |
| | 4 May. | „ 1315/67; Peter Brash and Wm. Young. | Lamps for hydrocarbons. | „ „ |
| 1870 | 4 April. | „ 1014/70; Wm. Young and Peter Brash. | Manufacture of illuminating gas. | „ „ |
| 1872 | 21 Aug. | „ 2487/72; Wm. Young, Peter Brash, and Andrew Scott. | Producing gas and oil from coal, &c. | „ „ |
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| 1875 | 2 March. | J.G.L.; letter. | Steam-jet exhausters. | „ xxv. 284. |
| | 23 „ | „ „ | „ „ | „ xxv. 401. |
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| | 29 „ | „ paper by Wm. Young. [9th July, Mr. Young became a member of the N.B.A.G.M.] | "The condensation of crude gases." | „ xxv. 803. |
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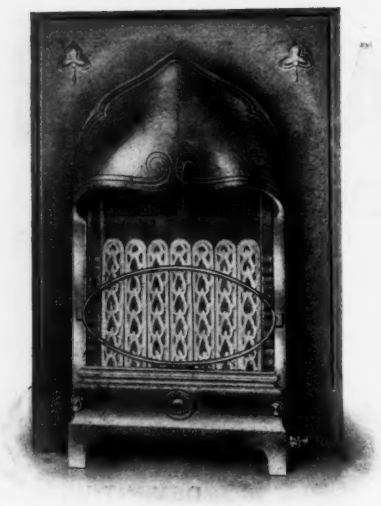

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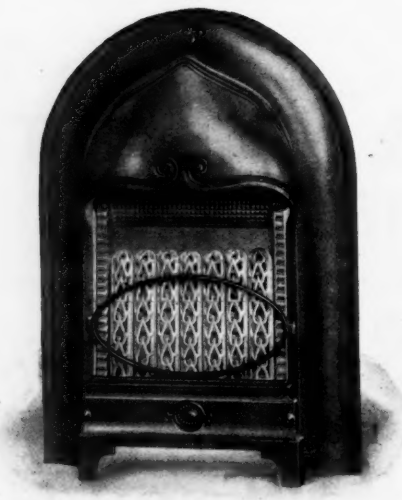

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# PROPOSED STANDARD SPECIFICATIONS FOR STREET LIGHTING.

In the "Journal" for July 11 and 25 (pp. 99, 225), we reproduced from the pages of the "Illuminating Engineer" some of the replies sent to them to a series of inquiries, as to a proposed "Standard Specification for Street Lighting," which were circulated previous to a meeting of the Joint Committee of various Technical Associations who are considering the matter.

It may be a convenience to repeat the list of questions. They were as follows:—

1. Ought the specification to contain a statement of: (*a*) The electrical energy or gas to be consumed; or (*b*) the amount of light provided; or (*c*) both energy or gas consumed and amount of light?
2. Should the amount of light supplied be specified in terms of: (*a*) The provision of a certain actual minimum illumination in the street; or (*b*) the provision of lamps of a certified candle power?
3. If illumination is to be measured, should this measurement be carried out (*a*) in a horizontal plane at a stated height above the ground; or (*b*) in a vertical plane; or (*c*) in some other inclined plane such as 45 degrees? (*d*) Should both the mean and the minimum street illumination be measured and specified?
4. If candle power is to be tested in the street, should (*a*) the mean spherical or mean hemispherical candle power, or (*b*) the candle power in several specified directions be tested?
5. Should the contract demand (*a*) actual measurements in the streets, or (*b*) only laboratory tests of the competing lamps previous to the acceptance of a tender, or (*c*) preliminary laboratory tests supplemented by periodical tests of the actual lighting conditions when the lamp is in position?
6. Should any test of the constancy of the candle power of the lamps be prescribed?
7. Do you advocate the introduction of any stipulation regarding the efficient shading of lamps, height above ground, &c., with a view to the avoidance of glare, such as is recognized to be dangerous and inconvenient to traffic and pedestrians?
8. Should any specific colour of the light be prescribed? If so, how should this be tested?
9. What other clauses would you suggest being inserted?

According to the current (September) issue of our monthly contemporary, Dr. Hugo Krüss, of Hamburg, has replied as follows:

1. Under all circumstances, it is of interest and great importance to determine the energy used (electric current or gas consumption), and also the amount of light produced thereby.
2. As a measure of the light, the determination of candle power does not suffice. The resulting mean illumination should be investigated and not the minimum only.
3. No general rule can be laid down as to whether horizontal or vertical illumination should be measured. In the case of illuminants distributed over extensive flat areas, squares, &c., measurements should be made in a horizontal plane; but in the case of streets provided with lamps arranged in a line, the measurements in a vertical plane are preferable. Besides the mean illumination, the maximum and minimum should be determined as a measure of the uniformity.
4. In the determination of intensity, mean spherical and mean hemispherical candle power are not sufficient. The polar curve of light distribution should also be obtained.
5. Measurements carried out in the laboratory are not enough, and should be supplemented by determinations of the illumination in the street.
6. Complete constancy on the part of many lamps (*e.g.*, arc lamps) cannot be secured. It should, however, be prescribed that the light should not vary by more than a certain percentage—say, about 20 per cent.
7. Recommendations are desirable, but must be adapted to the variety of lamp.
8. As regards colour, an approximation to the quality of light yielded by a white cloudy sky should be aimed at.

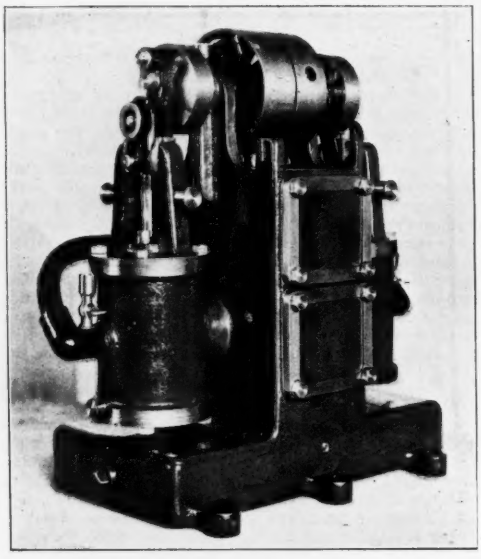
The list of queries has also been submitted, by Dr. Strache, of Vienna, to the Verein von Gas und Wasser Fachmänner in Austria-Hungary; and the Photometric Committee of the Verein has sent the following expression of their views on the various points raised:—

1. The Committee is of opinion that in the case of contracts only the candle power of the lamps to be used should be specified. It should be left to the contracting party to select the most efficient form of burner to furnish the required light. But when the critical comparison of existing examples of street lighting is in question, the consumption of gas or electricity of the lamps should also be stated.
2. In the case of a contract, it would not be practicable to specify the minimum illumination in the street; and it is greatly preferable to require only a certain candle power, as directed in 1. It would be a very tedious process to determine the minimum illumination in all parts of a street beforehand. The securing of a serviceable and uniform illumination is the concern of the local authorities, whose duty it would be to decide upon the number and spacing of the street lamps, and to stipulate how they should be arranged in the contract. But, again, in the examination and testing of existing installations, the determination of illumination is exceedingly important. Not only the mean horizontal illumination, but also the maximum, mean, and diversity factor should be ascertained.
3. The Committee holds the view that, on practical grounds, measurements of illumination should be made in a horizontal plane 1 or 1½ metres from the ground. The illumination of a vertical surface varies according to the plane selected, and is thus not adapted for precise definition. It would, however, be desirable to find a convenient method of rapidly determining the least and greatest illumination which such a surface can receive when turned in all directions.
4. The Committee considers that for purposes of street lighting, mean lower hemispherical candle power should be considered, and that this should be specified in contracts. Tests of mean hemispherical candle power should be made on lamps equipped exactly as they would be in the streets—*i.e.*, with reflectors, diffusing globes, &c. In addition to this quantity, the spherical reduction factor, and the polar curve of light distribution, should be required.
5. As a means of checking compliance with the conditions of the contract, only tests made in the laboratory are satisfactory. For this purpose, measurements carried out in the streets are too unreliable. The same applies to tests of the diminution of candle power in course of time, which should also be carried out in the laboratory. On the other hand, as far as the judgment of street illumination in general is concerned, periodical tests of the candle power and illumination in the streets may be carried out with advantage.
6. In contracts, the permissible diminution in light on the part of specified lamps should be prescribed. In the absence of any specific requirement of this kind, a maximum diminution of 25 per cent. might be allowed.
7. The Committee considers that the height of suspension should be stated separately for each street to be lighted; since the desirable height depends on the breadth of the street, the intensity of the sources selected, and other circumstances. If (under 1) the contract states the intensity of light demanded, but not the nature of the illumination, recommendations regarding the "glare" from the lamps selected are desirable. By "glare" is understood the specific intensity in candles "per sq. cm." of the light-giving surfaces of the source. This shall be taken to apply to the projected area of the illuminating surface in the normal direction of view. This applies particularly to electric glow lamps, for which not the actual superficial area of the filament, but the area enclosed within its limits should be considered. For the eye cannot perceive the actual form of the filament in lamps in the street. The permissible height of lamps must be judged according to the local circumstances; but the impression of glare depends to a great extent on the height of suspension. For street lighting it can be assumed in general that a brilliancy of 100 H.K. per sq. cm. is permissible. If the intrinsic brilliancy exceeds this value (as, for example, in the case of the electric arc) some method of diffusing the light—such as the use of opal glass globes—is desirable.
8. A source of light approaches natural conditions most closely when the colour of its light is as nearly as possible pure white. Artificial light can, in general, be regarded as a mixture of white light with light of some other colour. In a light of given composition, the percentage

of white can be determined by spectro-photometric means; and the minimum permissible value of this percentage could be agreed upon. Convenient methods of determining the percentage have still to be worked out. In order to form a judgment as to the qualities of a given street-lamp in this respect, the distribution of light in the spectrum must be determined.

## A VALVELESS COMPRESSOR.

Among the numerous high-pressure gas appliances which are supplied by Messrs. Melville, Ingram, and Cree, Limited, of No. 66, Victoria Street, Westminster, S.W., is a compressor of the valveless reciprocating type. It is a well-made machine, and has been designed with the object of securing simplicity by the employment of a minimum of working parts. Since the compressor was introduced some two years ago, over 150 have been supplied in London alone; and it is confidently anticipated that this number will very soon be largely added to—not only in London, but throughout the country, in connection with factories and for other purposes where high-pressure gas for lighting or heating is desired. The compressor is made in two sizes—a double-cylinder type, having a capacity of 1000 cubic feet per hour, at 60 inches pressure (as shown in the accompanying illustration); and a similar machine having a single cylinder, with a capacity of 500 cubic feet per hour. Where power to drive the compressor is not available, a small gas-engine may be substituted; and it is stated that a 1 B.H.B. gas-engine efficiently drives up to four 1000 cubic feet machines.



**Double Cylinder Valveless Compressor.**

It may be explained that the piston has a transverse central diaphragm connecting the two ends, whereby separate chambers are formed in the piston. Each chamber has an opening in the piston end; the opening of one chamber being at the opposite end of the piston to that of the other. During each stroke of the piston, a partial rotatory movement is imparted to it, so that the admission and emission ports will be alternately open to either chamber. By these means, it is pointed out, each end of the cylinder is open to the emission port during each of its periods of compression, thereby maintaining a practically constant flow of compressed gas or air to the reservoir or burner; while the inlet port is alternately open to each end of the cylinder during the period of suction. Thus the necessity for inlet and outlet valves is done away with. There is a bye-pass connecting the inlet gas chamber with the compressed gas reservoir; suitable means being provided whereby any excess of gas or air in the latter, at any predetermined pressure, is permitted to pass away into the chamber communicating with the source of supply, whence it again passes through the compressor.

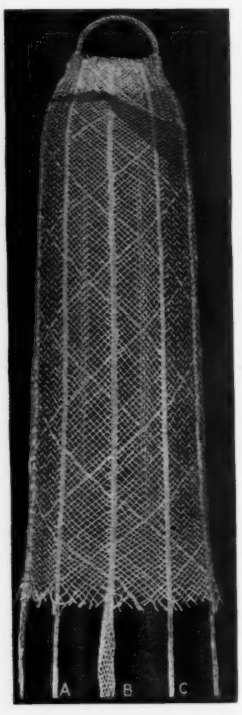
Another branch to which the firm are giving particular attention is the supply of irons for employment with high-pressure gas. The special pattern of iron to which they are drawing attention is one which has only a very small aperture all round—just sufficient to allow the products to escape, but not large enough to give rise to scorching of the goods on which the appliance is being used. The irons are made in all sizes, to suit the various requirements of laundries, tailoring establishments, &c.

The advantages of high-pressure gas are now so generally admitted, that Messrs. Melville, Ingram, and Cree have a wide field open to them.

Mr. Ernest A. Stickland, Assoc.M.Inst.C.E., Borough Surveyor of Windsor, has been nominated by the Council of the Institution of Municipal Engineers as President for the year 1911-12.

## THE "ROSS" PATENT MANTLE.

The chief distinguishing feature of the "Ross" mantle is that it is neither knitted nor woven, but braided, not of one continuous thread, but of hundreds of ramie threads which lie loosely across one another—thus avoiding any tension at the crossing points, and eliminating acute angles, with their attendant danger of cutting the thread. The fabric proper is supported by a strong skeleton of vertical and diagonal strengthening ribs; and it is this skeleton of supporting ribs that has been further improved. Hitherto, these ribs consisted merely of stronger (six-ply) thread; whereas now they are in themselves a miniature braid made on exactly the same principle as the fabric proper of the mantle, thus further adding to the elasticity, and resisting power, of the whole mantle.

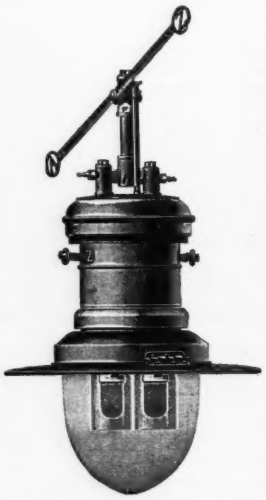



The accompanying illustration shows a raw stocking on the mould over which it is slipped in order to obtain the conical shape (and it might be mentioned incidentally that the braided fabric is said to be the only fabric that lends itself to obtaining the natural tapering of the mantle without having to gather the stocking in pleats or rucks at the shoulder, because owing, to the braiding, the fabric can be pulled into any shape required. A, B, and C illustrate some of the vertical ribs of the supporting skeleton after they have been pulled taut in shaping the mantle. B clearly shows the braided structure of the individual rib, as it has been opened out for the purpose.

We are informed by the Patent Appliances Company, of 15 and 17, City Road, E.C., that their last season's sales of the "Ross" mantle were three times as great as those of the season before. This shows the rapidly growing popularity of the mantle, which, it is claimed, is an ideal one for street lighting, on account of its singular strength and high efficiency. In consequence of this rapid increase in the output, a considerable reduction in cost has been effected.

## "GRAETZIN" OUTDOOR LAMPS.

Attention is drawn by Messrs. J. & W. B. Smith, of Farringdon Road, E.C., to a new type of "Graetzin" high-power low-pressure inverted outdoor lamp, which is claimed to give about 300-candle power per burner, with a consumption of some 7 cubic feet of gas per hour. It is made in one, two, or three burner sizes. There is a black enamelled wind and rain proof outside casing, with a white inside reflector.



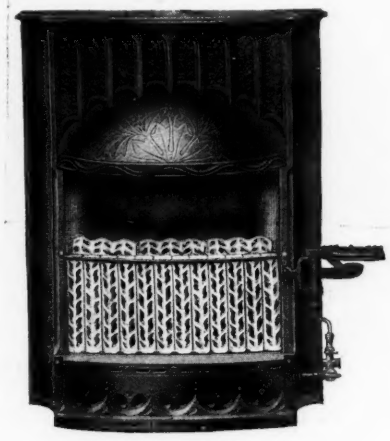
**New Type of "Graetzin" Outdoor Lamp.**

These lamps are supplied with a pear-shaped globe, similar to those used on high-pressure lamps. The globe can be wired, if desired. There are special large size glass inner cylinders and mantles. The gas-regulator is outside the top of the casing, and is operated by a loose key, which can afterwards be taken away, so that the gas adjustment cannot be tampered with. On the top of the gas-adjuster is a nut, and if this is removed, and the gas turned on, any foreign substance can immediately be cleared and blown out. The lamps are also fitted with a special flash bye-pass.

**Carbonizing Chambers in Vienna.**—The correspondent who forwarded the photograph of the carbonizing chambers at the Leopoldau (Vienna) Municipal Gas-Works reproduced in last week's "Journal," p. 586, writes to point out a mistake that was, by inadvertence, made in describing the chambers as "inclined." The type of chamber employed is the horizontal, built on exactly the same principle as that adopted by Messrs. Koppers for their coke-ovens.

## WRIGHT'S NEW GAS-HEATING APPLIANCES.

He was a wise man who said long ago, "To everything there is a season;" but to anything so ingeniously devised and so carefully perfected as the gas apparatus Messrs. John Wright and Co. have taught us to expect from them, there is not one season, but many. Their brilliant succession of inventions, beginning with the epoch-making "Wizard," and ending—will it ever end?—have changed heating by gas from the luxury of the few to the daily comfort of the many, and have set the high standard of constructive design, of ornament, and of technical efficiency to which a whole industry is gradually learning to aspire. And, truly, each successive season has seen a fresh crop of new creations emanating from the same source.



"Arch Druid."

This year Messrs. Wright have exercised a wise restraint in resolving to allow the present wide range of their recent inventions to continue, and even improve upon, the success they have already achieved, without for the present increasing "the embarrassment of the choice" by a group of new productions as numerous as in former seasons. Accordingly, this winter's gas-fire programme restricts itself to the augmenting of the existing "Wizard" and "Mascot" series by the addition of two fires which follow the lines originally laid down and hall-marked by wide public approval in successive (and successful) seasons, but go still further in the direction of plain-surface design, so as to present a neutral attitude to any scheme of ornament in the room where the stoves may be installed. This plain class of design, already foreshadowed in the early "Wizard" and "Mascot," also lends itself peculiarly to the porcelain-enamel finishes which have come to stay in gas-fire manufacture.

The "Merlin" is a round-topped fire and its companion the "Talisman" is of square outline. The "lines" of both fires are exceedingly graceful, and no more attractive fires have ever been offered to the public. Both stoves are made in three sizes—viz., with 10-in., 14-in., and 17-in. fires. A very effective variant on the ordinary black finish is the brass beading ornament with which they can be supplied. Gas authorities who are interested in the keeping down of all maintenance charges—and which of them is not?—will welcome the further extension embodied in the "Merlin" and "Talisman" of Messrs. Wright's original interchangeability method, by which, with the obviously necessary exception of the stove-front and fender, every part of these stoves is interchangeable with the same size equivalent parts of any and all of the entire range of "Thermo X" fires; so that, though a dozen patterns be listed by a gas authority, they only need the one stock of parts, and they can add the "Merlin" and "Talisman" to their hire list without putting a single extra spare part into their stores. The great value of this clever contrivance to the gas undertaking, in pounds, shillings, and pence, is too manifest to be enlarged upon.

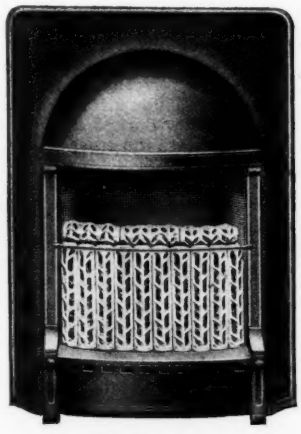
To enable consumers who have a "dog" coal-grate to replace it by gas-heating, the "Gelert" "dog" gas-fire will be welcome, as embodying the whole of the latest Essex Works perfectionments, including the duplex burner and the patent "Unitap," in a stove of singularly attractive design.

The trivet burner which Messrs. Wright have pressed on the industry as preferable for hygienic reasons to the old "nursery fire" method is this year improved, and has the original arrangement which automatically fixes it in the position it is moved into, so that accidental displacement is prevented.

Not least is an improved construction of the "radiants," rendering them much more resistant to the dangers of breakage in transit, while conserving all the unique capacity for radiation that has made the "Thermo X" the name to conjure with that it is to-day.

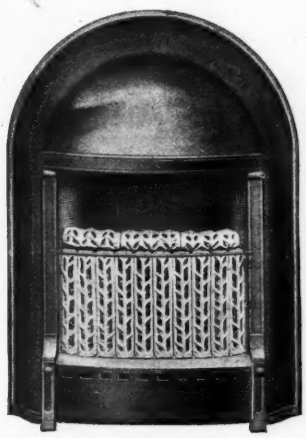
The "Garajo" boiler is another of those successes that look like happy hits to the outside world, but are known to be really the result of "an infinite capacity for taking pains" by all who, like ourselves, have had the opportunity of seeing on the spot the methods of patient and exhaustive experiment that attend the birth, or rather the evolution, of the Essex Works inventions. Such further evolution is now nearly completed, and shortly we hope to give some particulars in these columns of a new boiler of this class, but of greater capacity, and (shall we add) of greater capacities.

Delivery is much, but despatch is almost as important; and the very success of new apparatus is apt to cause a sudden and extensive demand that may prove an embarrassment as well as a blessing. To grapple with this, Messrs. Wright have been this year building large additions to their already huge warehouses for finished stock. These are now occupied, and they bring up the total floor-space to something like three-quarters of a mile in length; so that the enormous stock of fires they contain should meet the largest possible demand. The last enlargement covers the utmost available inch of land on their very large site; and so Messrs. Wright have bought a further site adjoining, and already the builders are at work on a suite of workshops to accommodate their rapidly increasing gas-furnace business, and to permit of a further increase of their huge foundry.



"Merlin."

"Gelert."



"Talisman."

## Lectures on Illuminating Engineering.

A course of twelve lectures on illuminating engineering has been arranged to be given at the Polytechnic, Regent Street, during next winter—from Oct. 31 to Feb. 15. The first six lectures will be delivered on Tuesday evenings, at 7.30, from Oct. 31 to Dec. 5. The two on Oct. 31 and Nov. 7 will be on electric lighting, by Professor J. T. Morris. Then on Nov. 14 and 25, Mr. J. G. Clark will lecture on gas lighting. Mr. E. Scott Snell will deal with oil, petrol, air gas, acetylene, &c., on Nov. 28. The last lecture of the first set will be by Dr. W. J. Ettles, on "Illumination and the Eye." The second series of lectures will be by Mr. J. S. Dow, who on the Thursdays from Jan. 11 to Feb. 15, 1912, will successively deal with: "The Measurement of Light," "Illumination and its Measurement," "Shades and Reflectors," "Daylight and Artificial Lighting," "The Colour of Artificial Illuminants," "Practical Lighting Problems." The lectures will be open to non-members of the Illuminating Engineering Society at a fee of 12s. 6d. for the entire course, or 2s. for single lectures. They will be illustrated by lantern slides and demonstrations.

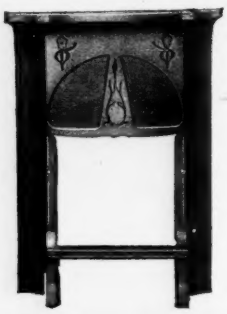
## SOME DEVELOPMENTS IN GAS FIRES.

We give to-day some particulars and illustrations of the Davis Gas-Stove Company's programme for the coming winter season.

To deal first of all in a general way with the "New Barless" series of fires for 1911-12, the main object in view all along has been to cut down as much as possible the number of parts to be stocked by gas companies. Standardization and interchangeability of parts, and all other maintenance considerations, have received first care; and the result is a series of fires that achieve a great measure of simplicity, which must make a forcible appeal to every engineering mind. Each of the fires under review is made up of two distinct portions—one useful, the other ornamental. The first is known for trade purposes as the "back," and comprises the burner, fuel, brick, cast-iron back, and canopy in one piece, the gas-controller, and the right and left hand gas-connection. This portion actually constitutes a complete and usable gas-fire in itself. The second portion is a "front" of ornamental design, made in a great variety of shapes and finishes. The illustrations clearly show the principle.

Alluding to what may be called the mechanism of the "New Barless" gas-fires, there are many important points to be noted; and we will here endeavour to touch upon the outstanding ones as briefly as possible. All parts are most carefully machined, so that any variety of front can be transposed at the shortest possible notice, without additional fitting of any kind. The Davis Company are to be congratulated upon the constant combination of

Back.



Specimen Interchangeable Front.

The "Royal."

The "Apollo."

The "Vesta."

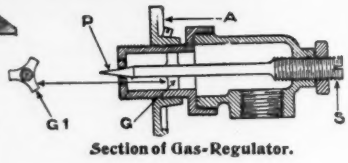
A SELECTION FROM THE "NEW BARLESS" SERIES.

the results obtained in their chemical and physical laboratories with those of a practical nature emanating from the workshops; and this happy intermingling of research and skill is apparent in the improvements which have been introduced into the fires now being launched on the market.

The burners are of entirely new construction, tending towards still greater heating efficiency. The fuel, changed both in design and chemical composition, has been so fashioned as to exactly fit the shape of the flame. The flame is aërated throughout its entire length, and uniform combustion thus takes place. The method of attaching and detaching the fuel is worthy of notice. The pillars are put in and taken out of the fire with the greatest ease, and are held in position by two fuel-clips—one at the top and the other at the bottom; the latter being finished in white enamel, and so adding considerably to the general appearance of the fire. The fire-brick has also been improved both in material and construction, to increase its radiating efficiency. The greatest attention has been expended upon the canopy chamber, which has been carefully rounded-off to lead all the gases by a natural course into the flue, in order to effectually prevent bye-passing. The fire casting itself is made entirely in one piece, thus obviating cement joints of any kind. The interchangeable principle already referred to extends to the brasswork of the "New Barless" gas-fires; there being one standard set of brass fittings for every fire in the series, whether simplex or duplex, nursery, side-boiling burner fire, or any possible combination. The air-adjuster is in a position where it is entirely accessible, but is at the same time hidden from view. The three-way cock provided can be used either with the simplex or duplex burner arrangement, and is especially designed to give

The "Inset" Fire.

Adjustable Trivet.




Section of Gas-Regulator.

free passage to the gas passing to the fire. We may also add that the right and left-hand gas connection is a standard fitting to all "New Barless" fires.

A notable example of attention to small details—a feature always prominent in connection with Davis specialities—is found in the gas-regulator, of which there is a sectional sketch. To the screw S, controlling the regulating pin P, is attached a guide G $G^1$, which ensures the pin taking a dead central position in relation to the gas-inlet, and remaining in that position. A represents the air-adjuster.

As regards the fronts or ornamental portions of the fires, these have been so constructed as to do full justice to any variety of finish which the intending customer may fancy. Particularly pleasing results are obtained with the leadless porcelain enamel and armour-bright finishes, which are a speciality of the Davis Company. Their large new enamelling works at Luton are now in full working order; and it is anticipated that there will be a big demand for fires treated in this department during the coming season.

There is one speciality introduced this season by the firm which is of considerable interest. This is their "Inset" fire, which is illustrated in combination with a suitable mantel register. The illustration makes clear the function of the fire, which is to fit in an ordinary register grate without unsightly projections of any kind. At the same time, it is claimed for this fire that it gives efficiency equal to that of an ordinary gas-fire fitted in front of the grate. The "Inset" is one of the "New Barless" fires; and all its wearing parts are interchangeable with the other stoves of the series.

Mention may be made of one or two accessories which combine to make the "New Barless" series of fires specially useful, as well as ornamental—more particularly the side boiling-burner, the brass wire dress-guard, and a special adjustable trivet, the advantages of which will be apparent. In bringing out the new series of fires, a successful endeavour has been made to meet the wishes and tastes of consumers who prefer to have a gas-fire with the old type of front bar. Any fire of the "New Barless" series may be fitted with a detachable bar. The Davis steamless radiator, as readers are aware, has already proved a very popular type of heater with gas undertakings and consumers alike. The Company give a three years' guarantee with every radiator sold; and it is stated that not a solitary part has had to be replaced under the condition of the guarantee since the introduction of the "Steamless" four years ago.

Enough has been said to show that the Davis Gas-Stove Company's programme for the season is one on which the Company must be congratulated.

---

According to an abstract published from the report of the British Consul at Kobe, the outstanding feature in Japan during last year was the number of gas plants which were erected both for the illumination of towns and for driving suction-gas electricity stations. In the early part of the year, the greater part of the orders were for British machinery; but during the latter portion several important contracts were secured by Continental firms and by local manufacturers.

# Davis's

# New Barless Gas Fires

*Chapter 1.*

WE hereby introduce to Gas Companies throughout the country an entirely NEW DEPARTURE IN GAS FIRE CONSTRUCTION.

The essential feature of the New Barless series of Fires is INTERCHANGEABILITY. Each Fire consists of two main parts: (*a*) the Back, virtually a complete and usable Gas Fire in itself, and (*b*) a Front of ornamental design, supplied in many different styles of pattern and finish. Every part is machine-fitted: any front INSTANTLY INTERCHANGEABLE.

We offer a choice of 95 varieties of pattern and finish.

Every Fire in the series is perfect from the maintenance standpoint.

*(To be continued next week.)*

**The Davis Gas Stove Company, Ltd.**
**LUTON.**

## SHOWROOMS

**LONDON - - - 59, Queen Victoria Street, E.C.**
**MANCHESTER - 4, Victoria Arcade, Deansgate.**
**PARIS - - - - - 82, Rue d'Hauteville.**

# DESSAU VERTICALS.

*Adopted all over the World.*

Total Carbonizing Capacity over **81** million cubic feet per diem.

Total Installations to date - **84.**

FOR FULL LIST OF INSTALLATIONS, SEE INSTITUTION NUMBER OF "JOURNAL."

**THE VERTICAL GAS RETORT SYNDICATE, LTD.,**

**17, Victoria Street, Westminster, S.W.**

# COAL TAR PRODUCTS.

**Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Dark Cresylic Acid, Granulated (Crude) and Sublimed Naphthalene, Anthracene, Refined Tar and Pitch. Sulphate of Ammonia containing a Guaranteed Minimum of 25 per cent. Ammonia.**

For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY,**

Works: ORDNANCE WHARF, EAST GREENWICH, LONDON, S.E.

**709, OLD KENT ROAD, LONDON, S.E.**

Telegraphic Address: "METROGAS, LONDON."

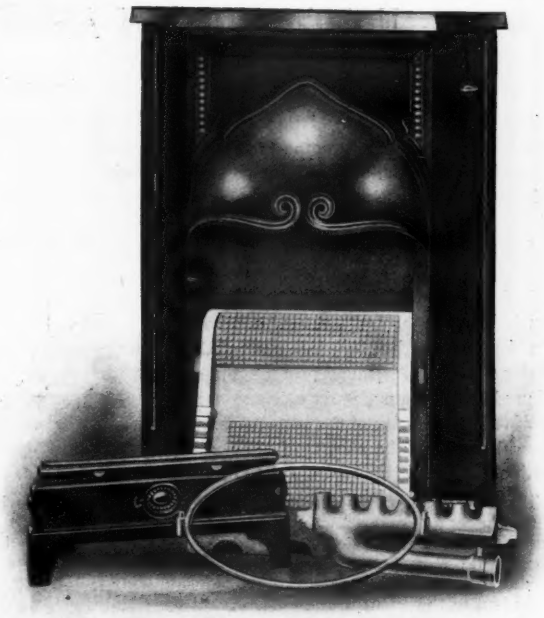
# MOBBERLEY & PERRY OF STOURBRIDGE LIMITED,

are now manufacturing (in addition to their ordinary "Best Stourbridge Quality") a specially High-Class Grade of Retort "BEST BRITISH" (B.B.) which for high temperatures and endurance cannot be excelled.

## NEW PARKINSON FIRES.

By calling at the High Holborn show-rooms of the Parkinson Stove Company, one is able to make personal acquaintance with an attractive new series of gas-fires which the firm are introducing for the forthcoming heating season. They are respectively named the "Pathan," the "Spartan," and the "Cretan;" and they possess various claims to consideration, in addition to their pleasing appearance.

In the first place, as the result of exhaustive experiments, the Company state that they have provided pillar fuel of a character which results in instantaneous incandescence being effectually secured—economy in gas consumption resulting from the fact that it is only necessary to light up at the moment that the fire is required. The fuel, it is noticed, is more open in construction than that hitherto used. The spacing-rack holds each "pillar" of fuel exactly over the centre of its burner-jet; so that the flame is utilized to the greatest advantage. The fender of the fire is removable by undoing two screws; and this permits of the easy lifting out, when necessary, of the burner, the fuel, or the back-brick. A reliable reversible burner is fitted; and there is a very substantial and extremely simple gas and air adjuster. In order to separately regulate the proportions of the gas and air, it is not necessary to remove the fender of the stove; and the object aimed at in the construction of the adjuster is the highest heating efficiency combined with the lowest possible gas consumption. The oval fuel-guard is of an even lighter pattern than before; and it is so designed as to take up correctly any expansion, and thus eliminate fuel fractures. The three patterns comprised in this new series of fires are each made in two sizes, so that there are six separate fires. But a point which is of much importance is that there are in all only two sets of parts.



**The "Cretan" Gas-Stove (showing loose interchangeable parts).**

To revert to the matter of appearance, it has already been remarked that the fires are attractive; and it may be added that they are excellently suited to the schemes of interior decoration now in vogue. There is nothing elaborate about their appearance—in fact, strict simplicity characterizes them throughout—and they are eminently adapted for art black finish, though, of course, they can be had in porcellanite colours, if preferred.

There is every reason to predict a good measure of popularity for the "Pathan," the "Spartan," and the "Cretan" patterns of gas-fires during the coming season.

**The "Pathan" Gas-Fire.**

**The "Spartan" Gas-Fire.**

## ARTIFICIAL LIGHT IN SIBERIA AND MANCHURIA

We have received from an esteemed correspondent who has just travelled to Kharbin by the Trans-Siberian Railway some interesting remarks on the methods of lighting which he has observed *en route* and at his destination.

He reached Kharbin (which he mentions is spelt Kharbin by the Latin races, Harbin by the German, and Charbin by the Russo-Asiatics) after nine days and nights from Moscow in the Trans-Siberian *train-de-luxe*. From Cheliabinsk, which is the first place of importance after Siberia is entered, to Manchuria, there appeared to be only one town—viz., Irkutsk—which was lighted by gas. At the smaller stations, electric light or more frequently high-pressure petroleum lights were found. The *train-de-luxe* was electrically lighted, and had a Deutz engine; but other express trains had miserable oil-lamps, and the fast trains candles. The mixed trains were either without lights or had a feeble lamp by the door at each end of the cars. Even the technical traveller is forced, he says, by the contrast of these lights with the moonlight on Lake Baikal and the sunshine on the Ural Mountains, to become an enthusiast for Nature. Kharbin, however, with its arc lamps brings a change, and would make the traveller believe that he had been transported back to a badly-paved European commercial town, were it not that the yellow wearers of the pigtail remind him that he has travelled 6000 miles. In the adjacent Chinese town of Fu-Dza-Dzan, however, the primitive oil-lamps sold by the Standard Oil Company are to be found side by side with every conceivable mode of lighting. A year-and-a-half ago, Kharbin, which has a population of 60,000, had no public lighting at all; and seven years ago it was still a swamp, in which fifty coolies were required to liberate a vehicle which had stuck fast, and a journey of half-an-hour cost half-a-sovereign. But in the absence of political disturbance, the town will become a rival of Shanghai.

Kharbin occupies an incomparable position, being the starting point for East Asia, South China, and the Amoor district, the junction of three great railways, and situate on the Sungari river, which is navigable by ships for 1000 miles. It is bound to become, he considers, an exceptional commercial centre; and there is a great chance for speculators and a crying need for "more light." But all depends on whether the Russian General or the Chinese Governor has the last word.

# NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

## Jubilee Meeting in Glasgow.

The North British Association of Gas Managers has been the first Association for the promotion of the gas industry to reach the Year of Jubilee—founded as it was on the 30th of July, 1862. The Jubilee Meeting was held last Thursday in the hall (in Bath Street) of the Philosophical Society of Glasgow—a lecture theatre in which the Association have been privileged to make a good deal of their history. There was this year a change in date from the end of July to the beginning of September; the earlier date being considered by many of the members to be inconvenient, because it arrived before the financial affairs of the previous year had been finally dealt with. Judging by the number who were present last Thursday, the change in date, it may be concluded, has approved itself to the majority of the members. Mr. GEORGE KEILLOR, the Gas Manager to the Corporation of Broughty Ferry, was President, and opened the proceedings shortly after half-past ten.

The PRESIDENT said that, on taking the chair at the fiftieth annual meeting of the Association, and before proceeding to the ordinary business of the Association, he wished to mention how pleased he was to see so many members present. They were especially glad to have with them that day Mr. Shadbolt, the President of the Institution of Gas Engineers; and they had with them some other fraternal visitors. He wished to give them all a very hearty welcome.

Apologies for absence were intimated from Dr. Beilby, Dr. Harold G. Colman, Mr. W. Doig Gibb, Mr. John Young, and from the Presidents of all the English District Associations.

The PRESIDENT announced the receipt of the following telegram: "Congratulations on attainment of Jubilee of North British Association—Canadian Gas Association."

The HON. SECRETARY and TREASURER (Mr. Laurence Hislop, of Uddingston), having read the minutes of the meeting held at Dunfermline last year, these, on the motion of Mr. J. M'LEOD, of Greenock, seconded by Mr. R. SIMPSON, of Cambuslang, were unanimously adopted.

### REPORT OF THE COUNCIL.

In introducing the subject of the report of the Council,

The PRESIDENT referred to the death, since the report was prepared, of Mr. Peter Hurll, one of the extraordinary members. He also took the opportunity of pointing out what might appear an apparent inconsistency between the report and the *agenda* of business. They would observe that the Council had arranged for the inaugural lecture in connection with the William Young memorial scheme to take place that day; but about a month since they had an intimation from Dr. Colman that he found it impossible to fulfil his obligation in this matter; and the Council, most reluctantly, had to accept the situation. On account of this, they were not having the lectureship inaugurated that day. He moved the adoption of the report.

Mr. S. MILNE (Aberdeen) had very great pleasure in seconding. The William Young Memorial Fund, he said, had become an accomplished fact. The Council regretted that so few of the members came forward with papers for the annual meetings. This was unfortunate; and they hoped that the mere mention of the fact in the report would make members take the matter to heart, and that they would come forward with papers which would be of interest to them all.

The report was then agreed to. The following are its principal contents:—

### ANNUAL REPORT OF THE COUNCIL.

In the course of their report, the Council state that the membership of the Association at June 30 last was 260, compared with 266 at the close of the previous year—a decrease of six. The membership is now made up as follows:—

| | |
|---|---|
| Ordinary members | 166 |
| Associate members | 12 |
| Extraordinary members | 78 |
| Honorary members | 4 |
| | 260 |

The Council record that the following members have ceased (by resignation or otherwise) to be connected with the Association:—

Honorary Member—Thomas Whimster, of Perth—deceased.
Ordinary Member—William Mitchell, of Dalry—resigned.
Do. —James M. Paterson, of Langholm—deceased.
Do. —David Small, of Largs—resigned.
Extraordinary Member—James Brown, of Hamilton—deceased.
Do. —James Milne, of Edinburgh—resigned.

They add: All will note, with regret, the gaps which have been left by death in the ranks of ordinary and extraordinary members, while from among the honorary members the Council have to deplore the loss of Mr. Thomas Whimster, of Perth, who was for the long period of 44 years the valued and highly respected Gas Engineer and Manager to the City of Perth. Mr. Whimster was at all times a progressive and versatile worker, and a liberal contributor to the "Transactions" and discussions of the Association. He was President upon three occasions—viz., in 1865, 1870, and in 1883; while he had the signal honour of reading the first paper to the Association, the subject being "An Improvement in the Working of the Hydraulic Main." He was made an honorary member in 1887; and he died at the ripe old age of 92. Mr. Whimster was among the first to join the ranks of the Association, immediately upon its inception in 1862; and his death, in September last, removed the last remaining personal tie between that period and the present time.

In accordance with the rules, the Council recommended the following for membership:—

*Ordinary Members.*

| | |
|---|---|
| A. P. Dale | Beith |
| James Jardine | Dalbeattie |
| James A. Tait | Bridge of Allan |

*Associate Member.*

Thomas Carmichael . . Dawsholm Gas-Works, Glasgow

*Extraordinary Member.*

George Clark, Managing Director of the Bryan Donkin Company, Limited, of Chesterfield.

Mr. George Keillor (Broughty Ferry) was appointed delegate to represent the North British Association on the Council of the Institution of Gas Engineers for the year 1911-12.

During the past year the Council had two applications for assistance, which, after careful investigation, were duly granted and suitably acknowledged.

The Western District and North-Eastern District Commercial Sections continue, they say, to do good work, numerous subjects of interest to the gas industry having been considered by them during the past year.

After referring to an exchange of telegrams between the Association and the German Association of Gas and Water Engineers, in October last, the report proceeds to deal with the "William Young Memorial Lectureship Fund." They say: The Council are pleased to report that the fund is now an established fact. The Council considered it advisable to inaugurate the lectureship at the earliest possible date, and, consequently, agreed to invite Dr. Harold G. Colman to deliver the inaugural lecture at the present meeting. It was arranged that the subject would be "Carbonization," with reference to William Young's work. At the same time, it was agreed that an appreciation of the life and work of William Young should be written and circulated among the members. This important task was entrusted to the capable hands of Dr. Alfred Daniell.

The Council regret that members of the Association do not come to their assistance and volunteer papers for discussion at the annual general meetings. It is, they say, becoming increasingly difficult to make up a programme for the annual meetings, and, as the number of papers or communications, "volunteered or canvassed, has reached vanishing point," the Council consider it their duty to mention the fact in their annual report, and appeal to members to give this important matter their earnest consideration. They invite suggestions and discussion thereon.

Having regard to the volume and importance of the secretarial work of the Association, the Council unanimously recommend (according to the rules) that the remuneration to be paid to the Secretary should be fixed at thirty guineas per annum.

(Signed) GEORGE KEILLOR, *President.*
L. HISLOP, F.C.S., *Secretary and Treasurer.*

*Final Report of Special Committee on William Young Memorial Fund.*

The Committee report that the capital sum required to establish "The William Young Memorial Lectureship Fund" has now been fully subscribed. At the date of the Committee's last report, a second circular inviting subscriptions was sent to those members of the Association who had not then contributed; and the response to this, together with further donations from some who had already subscribed, brought the total amount of subscriptions (including bank interest) up to £654. After considering various investments, the Committee purchased 3 per cent. debenture stock of the North British Railway Company; and £810 worth was secured, at a price of 80 per cent., or a total cost, *plus* stamps and commission, of £654 14s. 3d. This will realize an annual income of £24 6s. (less income-tax). A draft of the "Deed of Declaration of Trust" was prepared; it was agreed to nominate the President, the Vice-Presidents, and all the Ordinary Councillors (and their successors in office) as trustees.

The Committee express their best thanks to all those, inside and outside the Association, who so generously contributed to and otherwise assisted in bringing this matter to a successful issue.

(Signed) ALEX. BELL,
Honorary Secretary to the Memorial Committee.

### EXTENDING THE USEFULNESS OF THE ASSOCIATION.

Mr. S. B. LANGLANDS (Glasgow) said that, in the annual report, a point was raised in connection with the extension of the usefulness of the Association. He took it upon himself to mention this matter, because—not being a gas manager—he could speak on behalf of those who were. He would like if their basis of membership could be broadened, and be not strictly confined to gas managers. They had many among them, connected with the distribution and sales departments, whom it might be advisable that the Association should recognize in the full capacity of members. He was not a gas manager now, and seeing they had given him the privilege of membership, they might extend the same advantage to others. He was not going to propose any resolution; but perhaps the Council might consider the matter, and bring forward a proposal upon it. They might give a lead to other Associations in this respect.

The PRESIDENT remarked that they were all pretty much in sympathy with Mr. Langlands' views, and the Council would take the subject into consideration.

STRENGTHENING THE BENEVOLENT FUND.

Mr. J. W. NAPIER (Alloa) directed the attention of the meeting to the amount at the credit of the "Excursion Fund" account—£35. He thought this was too much for the purposes of the fund. He would propose that £20 of the amount be transferred to the "Benevolent Fund" of the Association. This fund was deserving of the best support of the Association. It was a fund which it should be their best endeavour to increase; it was a fund which appealed to their sympathies.

Mr. A. MACKAY (Montrose) seconded, and the proposal was agreed to.

The PRESIDENT said this question was discussed by the Council some months ago, and they decided to leave the balance as it was, because sometimes, on an excursion, both ends did not always meet. But he agreed that £20 might very well be transferred to the Benevolent Fund.

## THE PRESIDENT'S ADDRESS.

The PRESIDENT in his address said:—

Gentlemen,—Permit me again to thank you for the honour you so graciously conferred upon me at the last annual general meeting of the Association. In electing me to the presidency at that time, you not only conferred an honour upon me—an honour I highly appreciated—but you also bestowed a seasonable compliment upon the district which gave birth to the first regularized Association of Gas Managers, and to the town of Broughty Ferry, in which was held the first technical meeting of the Association, the Jubilee Anniversary of which we have the honour to celebrate to-day. At the time of my election, I was deeply conscious of the fact that the custom of your procedure alone, and not personal merit, was responsible for my elevation to the presidential chair; and to-day, with a fuller knowledge of the duties and responsibilities involved, I am more conscious than ever of my inability to follow in the footsteps of your distinguished Past-Presidents. However, the honour of the chair, and the conduct of the affairs of the Association, having been entrusted to my care, I determined with what ability I possessed to maintain the traditions and prestige of the office—well knowing that the heritage bequeathed to me by my predecessors in office (in the building-up of which so much zeal and industry had been expended) had to be again transmitted untarnished, and with even larger additions, to another.

A survey of the past year's work encourages me to claim on behalf of the Council and myself that the fifty years' heritage, of which we are so proud, has not been tarnished while in our keeping; neither has it diminished in value nor in usefulness. Indeed, I venture to opine that the Association is at the present time more firmly established than at any previous period in the annals of its history. For this satisfactory state of affairs, we are primarily indebted to those who, in the early sixties, settled the foundations of our Association upon a firm and permanent basis. Credit is also due to the long line of able and distinguished office-bearers, and to such experts as Dr. Stevenson Macadam, Dr. Wallace, Mr. William Young, and others, who have, ever since the inception of the Association, earnestly endeavoured to build-up a structure worthy the designers. Nor should we forget to thank those who, within recent years, succeeded in remodelling the fabric and in improving and perfecting its business arrangements.

The fiftieth annual general meeting (the Jubilee meeting) of the Association is being held to-day. The occasion is unique in the history of the gas industry; and this meeting should be second to none. I have done my best to work for such a result; and I hope it may be effectual. But without your sustained attendance and active co-operation, that result is unattainable. I rely, therefore, upon your assistance. Being assured of your sympathetic and hearty support, I am optimistic enough to predict that at the close of the conference we shall be able to congratulate ourselves upon the success of the Jubilee meeting, which, we trust, may leave behind it an indelible lustre, and mark the beginning of a new era in the economics of coal-gas production and application, and also in the advancement and prosperity of the industry and the status of the profession.

Of late, there has been quite a plethora of anniversary and centenary celebrations. Never before, however, has there been a Jubilee celebration in connection with an organized Association allied to the gas industry. Lord Rosebery, who is much in demand upon such occasions, thinks the celebration business a bit overdone; and I am inclined to agree with that opinion. But upon this occasion we cannot allow the dictum of a peer, or a mere personal opinion, to deter us from celebrating the Jubilee Anniversary of this Association. At the present time, we are not to celebrate the unique event by unveiling a public monument to the memory of the originators thereof. That may come at a later date; but, meantime, if you seek their monument, look around you—look at the number and strength of the organized associations now in existence throughout the world. Compare the puny weakness of the gas industry as it existed fifty years ago with its strength and invincibility to-day, in spite of extraordinary competition, and marvel at its unparalleled success. It would require a volume to adequately review the birth and progress of the coal-gas industry, with its lighting, heating, and power developments. But, for the present, suffice it to say that all the improvement and progress have come about in the age of organization and association; and as long as a single organized and properly constituted Association of Gas Managers exists, so long will it be a living memorial to the memory of the originators—Lowden, Mackenzie, Myers, and Proctor.

There was a time in the history of the Association when a President had an opportunity in his valedictory address of being retrospective. But in these days when everybody is a close student of the encyclopædic Technical Press, it would be highly unprofitable to weary you with a belated and incomplete retrospect. The Press, I desire to say, are entitled to all praise for providing us, week by week, with a down-to-date technical feast of the highest value; and the care and ability exercised by the Press in the futherance of our mutual interests is something for which they are justly entitled to our most cordial thanks.

THE HISTORY OF THE ASSOCIATION.

The Association having attained its Jubilee on the 30th of July last, it is perhaps incumbent upon me to give you, especially for the information of the younger members of the Association, a short *résumé* of the history of the North British Association. I fear, therefore, I must trespass for a time upon your patience and good nature. I am fortunate, indeed, in having such a theme to discourse upon, because, without plagiarism, it is now impossible for a President not having a predominating occupation or study to find a fresh subject on which to address an assembly of practical business men.

It was in the month of January, 1862, that the four originators of the North British Association of Gas Managers accidentally met in the well-known town of Cupar-Fife. These gentlemen (now all deceased) were Mr. J. Lowden, of Leven, Mr. W. Mackenzie, of Cupar, Mr. G. Myers, of Broughty Ferry, and Mr. W. Proctor, of Forfar. Even at that time these gentlemen recognized the advantages which would accrue from intercommunication, organization, and association; and, on talking the matter over, it was agreed to ask the co-operation of all the managers in the counties of Fife, Kinross, Perth, and Forfar. The result of this chance meeting was that, on the 30th of July, 1862, the first regularized meeting took place—twenty gas managers being present, when the "Association of Gas Managers for the Four Counties of Fife, Kinross, Perth, and Forfar" was formed. The first and only business overtaken on that day was the all-important matter of framing and adopting a set of rules by which the proceedings of the new Association were to be governed; and so well did they perform their task that the rules remained in force, pretty much as originally drafted, till 1909. Thus was laid, in the words of Mackenzie, "the foundation of our Association, and a new era inaugurated in the history of gas manufacture and supply." Unfortunately, owing to the unpardonable modesty of the early members, the first records, in the shape of annual reports of proceedings, do not begin till the year 1867.

The first annual meeting of the Association was held at Cupar-Fife; and the first President was Mr. J. Lowden, of Leven. Mr. Lowden was also in the chair at the second annual meeting, which was held in Broughty Ferry in 1863. At this meeting the late Mr. Whimster, of Perth, presented and read the first technical paper submitted to the Association; the subject being "An Improvement in the Working of the Hydraulic Main." Mr. Proctor was President in 1866; and he died in 1867, while occupying the chair for the second time. Mr. Myers, I understand, could not be persuaded to take the chair; but, as one of the originators, his work on behalf of the young Association was nevertheless of much value, and some day we hope to have the pleasure of welcoming his esteemed sons to the presidential chair.

For some considerable time prior to 1862 the necessity of forming an Association of Gas Managers had been a cherished idea with Mr. Mackenzie; and there can be no doubt that we are indebted to him for its inauguration. Mr. Mackenzie, who at the time of his death was Gas Engineer and Manager at Dunfermline, was the able and much-respected Secretary and Treasurer of the Association from the date of its inception till his retirement in 1879. He was the popular President of the Association in 1882 (the year of its majority); and he died on April 11, 1893.

Shortly after the establishment of the Association several others were started in different parts of the country. In September, 1862, the "Scottish Association of Gas Managers" was formed in Edinburgh, with a membership of 22. Very soon afterwards, however, the Scottish Association lost its identity; for we read that in the year 1865 it made a proposal for its amalgamation with its Northern rival. The proposal was favourably entertained, and union took place upon Sept. 14, 1866. Thereafter, this Association, with the name it now bears—"The North British Association of Gas Managers"—and with a membership of 54, began a more extended career of usefulness.

The managers in the West of Scotland were slow in realizing the benefits of organization; and it was not till 1872 (under the guidance of Mr. W. Key and four others) that they determined to follow the lead of the "wise men of the East," and organize an Association to be called "The West of Scotland Association of Gas Managers." Their first meeting was held in Dumbarton on the 8th of April, under the genial chairmanship of Mr. Key, who fully explained the object of the meeting. It is now interesting to note that the West of Scotland Association was formed for the benefit of managers of works where the annual manufacture of gas did not exceed 30 million cubic feet, and because of the fear

current at that time that the North British Association was about to be gobbled up by the British Association, as the premier English Association was then called. It was further argued that the annual general meetings of the North British Association did not appeal to a very large majority of managers of small works, inasmuch as the meetings being held annually, sufficient opportunity was not given to the members for meeting together and comparing notes "respecting difficulties encountered in the course of working." It was therefore proposed to meet quarterly, and each time in a different locality—an arrangement which, I believe, was soon afterwards changed to half-yearly. The West of Scotland Gas Association was responsible for introducing the incomparable William Young to the gas industry; and it continued to do excellent work for about ten years, when, by mutual consent, the members decided to sink the individuality of their Association and join forces with the North British Association. This step was taken in 1883, entirely in the interests of union and progress, and it has never been regretted.

I think the originators of our Association displayed much wisdom when they determined that it was not to be organized for the pecuniary gain of the individual, but chiefly (if not altogether) for the benefit of the industry and the gas consumer. The general public, however, were slow in realizing this—even to-day our object is imperfectly understood; but when it did dawn upon them that the chief desire was to benefit humanity, the mountain of prejudice which had so long been an obstacle to the real advancement and progress of the gas industry was soon swept away, and very soon a more healthy tone was observable in the public mind.

Prior to the advent of the pioneer Associations, engineers and managers preferred to work in secret, believing in the policy of the "closed door." But, fortunately, after their inauguration this stupid policy was speedily abandoned; and managerial aloofness and selfishness, so prevalent at that time, became a thing of the past. Undoubtedly, these Associations heralded the dawn of a new era. They were the precursors of epoch-making events; and their establishment engendered an *esprit de corps* among engineers and managers which was of the utmost value to the industry and the profession.

That this Association has been potent for good, all will acclaim; and that it is trying to fulfil its mission, none will deny. We are proud that the North British Association is the organized progenitor of the now world-wide family of gas associations; and we here record the strong sense of our indebtedness to the pioneers of the movement which has been in the past, as it will be in the future, of inestimable value to the gas industry at large.

### THE ANNUAL "INFORMAL MEETINGS."

This brief, and very likely to you, tedious *résumé* of the Association's early vicissitudes would be incomplete without reference to the "Informal Meeting" of gas managers which was called into being immediately after the union of the North British and West of Scotland Associations.

After the passing of that event, certain West of Scotland men arranged matters so that they could (without opposition to the North British Association) "meet once or twice a year in an informal way for the purpose of talking over subjects concerning the industry, and to take council one with the other respecting difficulties encountered in the course of working." The leading spirit in this movement was the late Mr. James M'Gilchrist; and he convened a meeting in the spring of 1884, which was well attended by West Country gas managers. This spring meeting, which at that time perpetuated the memory of the defunct West of Scotland Association (but which has now no significance), has no organization, no committee, but only a "Convener," who undertakes the duty of convening the meeting and nominating a Chairman. At the time of its inception, this meeting was truly informal—so much so, indeed, that at the first meeting, held in 1884, a resolution was actually passed to the effect that there should be no report of the proceedings. But there is now no doubt that these meetings are much more formal than the originators ever contemplated that they should be; and to my mind the present-day Commercial Sections, if linked-up with their central organization and conducted upon broad business lines, supply more than the want felt by those who, in 1884, brought into being the "Informal Meeting" of gas managers.

At one time the Informal Meeting had a purely local or parochial significance; but now, with the lapse of time and the exigencies of the age, it has become an institution of much wider significance. That the Informal Meeting has become a highly popular institution, no one will deny. Moreover, it is perfectly evident that there is a growing necessity for a "conversational" meeting in the spring of the year. But having regard to the origination of the Informal Meeting, the growing importance of the industry, the ever-increasing necessity for consolidating our forces, the desire to improve the status of members of the profession, and the fact that the success of the Informal Meeting is largely, if not entirely, attributable to the presence of members of the North British Association, is it wise? is it in the best interests of the industry and the profession? and will it make for solidarity and progress, to continue to conduct this highly-popular meeting in an unorthodox manner?

### THE NORTH BRITISH ASSOCIATION AND ITS WORK.

During the past year your Council have given much time and thought to the duties of their office; and, personally, I am much indebted to them for their invaluable assistance. The duties of office are multifarious and ever-increasing, and yearly they become more onerous. But this is not to be wondered at, seeing that we live in a progressive age, and that the scope of the Association has been widened and strengthened. Under such circumstances, therefore, it would indeed be strange if the work of the Council did not increase in volume, if not in importance.

With a membership roll of 260, there must of necessity be divergencies of opinion on many matters; and if the efforts of your President and Council appear to some to have failed, then I am ready to assure them that it has not been through lack of endeavour. Rather would I attribute any apparent inertness on our part to the apathy and inactivity of the members generally. I am ready to admit that the inertia may be attributable to the fact that members have only an opportunity once a year of meeting to discuss the affairs of the Association, and perhaps also because they are aware of the limitations of the Association (now that it is affiliated with the Institution of Gas Engineers), or it may be because of our easy-going belief and reliance in the industry's endless power of self-development and improvement. But, however it may be, there can be no doubt that our outward contentment with the conditions of things already existing (while in private and *inter pocula* we adversely criticize the endeavours of the Council) is responsible for much of the inertia. At the present time a spirit of listlessness and self-sufficiency is rapidly diffusing through the whole of our ranks; and doubtless when you learn that not a single reply was received to the circular soliciting communications for this meeting, you will appreciate the situation, and agree with me when I say that we are not sufficiently in earnest, that there is a lack of interest in the affairs of the Association, and much indifference as to its future. I wonder what would have happened had there been no business programme to-day? Yet, notwithstanding considerable effort, personal and otherwise, this meeting was perilously near being without one. I am afraid our fifty years' experience, aided by a new constitution, has not yet taught us the value of zeal and enthusiasm, organization and association. Somehow or other, and without being pessimistic as to the future of the industry, I think we have reached a turning-point in our history as an Association, and we must at once bestir ourselves if we are not to be left far behind in the race for supremacy.

In these stirring times, we should not wait till the electrical tout has invaded our stronghold and spiked our guns before taking action; neither should it require the advent of the annual general meeting to rouse us from slumber to a sense of responsibility. But as regards many of us, at any rate, I am afraid it is only when we are hard-pressed and in need of succour that we leave the haunt of the dormouse and attempt to interest ourselves in passing events. Our interest, however, is superficial and unstable; and it wanes with the passing of the annual meeting.

Of course, it is at all times difficult to shake off the fetters of time-honoured custom and red tape. But if we desire real progress—and I believe that at heart we all do, though we may have different ideas as to how best to attain our object—we must be "off with the old and on with the new." We are sick of unreality, and aweary of shadows. The business of the Association does not, as many think, begin and end with the annual general meeting. Neither does it exist for the pleasure and profit of present-day members only. Nor should it be considered the primary duty of the President to canvass for papers for the edification of the members. Such a view is, of course, fundamentally wrong; but I am afraid it is fast becoming part of our creed.

In future let us be less credulous regarding the industry's power to sustain us in perpetuity, without our individual and united assistance. Let us cease to think parochially, and let us look upon our Association as an active business organization with an object in view—a gas engineer's union of vital and ever-growing importance to the industry and the profession, and not as a mere perennial social gathering. I might also say something about the growing tendency to cabal. But suffice it to say that it would be a harbinger of much good if "out of school" criticism ceased, and, instead, we developed a *penchant* for criticism at the regularized meetings of the Association. Open, fearless criticism is always welcome and commands respect; and it would materially help to check the growth of indifference and lack of interest at present pervading our ranks.

### THE SELECTION OF OFFICE-BEARERS.

Now that I have unfolded my tale of woe, permit me to atone for my daring by assuring you of my sincerity. Indeed, I hope to make amends by offering a few suggestions and friendly criticisms which might be of ultimate value to the Association. For instance, it is of growing importance that we should be discriminative in the choice of the men we wish to take charge of our business affairs. They should be earnest men; men with broad, sympathetic, and progressive views, and possessing more than an average inclination to work and act. They should not be indifferent to the interest of the industry and their *confrères*. Their aim should be the improvement of the status of members of the profession. They should not be seekers after self-aggrandisement. They should know no party, and belong to no clique.

In selecting men for office we should eliminate the personal element altogether; and, irrespective of a man's "size" or social standing, nominate him for office if he has brains. After all, it is brains that count and not brawn. It is well to remember, therefore, that capable business men with lofty aspirations are often to be found struggling against fate in lowly positions. There

not being enough "plums" to go round, we cannot all get them. Somebody must go without. But, of course, it does not necessarily follow that because one is in charge of a "big" works that he is in every other way the superior of his "little" neighbour. Promotion nowadays not being always in accordance with ability and experience, it very often happens that the fortunate "big" man is more inexperienced than the less fortunate "little" man. But somehow or other the claims of the capable "bottom dog" are invariably ignored. Of course, there are "big" men and "big" men; but those of the "and" variety are easily singled out, and they possess our full confidence and highest respect.

### SUGGESTED RE-ARRANGEMENT OF MEETINGS.

It is next suggested to my mind that the present "Informal Meeting" could with much advantage become the spring or half-yearly meeting of the North British Association. I have an idea that the so-called "Informal Meeting" of gas managers would be of more utility to the profession if it were quietly coupled-up and run in unison with the organization of the North British Association. And I think all are now agreed—apart from the pervicacious member and those who have more faith in the dead past than in the living future—that early steps should be taken to link it up and thus conserve and solidify our common interests. It is, I am sure, the ultimate destiny of the "Informal" to be run in unison with the "North British;" and it should hurt no one's susceptibilities to designate the "Informal Meeting of Scottish Gas Managers" the "Spring Meeting" of the North British Association, if under the guise of a new name it retained its informal characteristics, and improved its status.

The Chairman of such a meeting could be the President of the Association for the time being; and it would be his duty to wear the "Informal" chain of office while presiding over the deliberations of the meeting. There would be no address from the chair, and no set papers would be submitted to the meeting. As usual, any member would be in order in submitting for discussion topics of general interest; and special subjects upon which it might be desirable to have a specially spirited discussion could be put on the *agenda*.

Then what about the Commercial Sections? Could not these important district organizations be so utilized as to make the work of the spring meeting, and the Association generally, even more interesting than at present? Could not their business be arranged so that the Chairmen of the various sections could always take an active and leading part in the work of the suggested half-yearly meeting—the annual spring meeting of the Association? Could not, indeed, the Commercial Sections become in reality the quarterly district meetings of the Association, and thus achieve the object desiderated by Mr. Carmichael in 1906? I think so, and others think so; but meantime we are powerless to act. At all events, it does seem to me to be akin to folly to continue to allow these valuable auxiliaries to "paddle their own canoes," and gradually drift apart and sink, or else remain for ever in a position of splendid isolation and comparative uselessness.

I have found the quarterly meetings of the North-Eastern Commercial Section of considerable value; and I see no reason why our District Commercial Sections should not now be more closely linked up with the central organization—each with its own Chairman, Committee, and Honorary Secretary, regularly reporting progress to, and obtaining assistance from, the Council of the predominant Association.

Then the usefulness of the spring meeting might be extended in yet another way. Could not the local Junior Associations be made more valuable adjuncts of the Senior Association? Are they also unworthy of our special consideration? Would it not be in the best interests of the industry and the profession to recognize them officially? And if the members of the Junior Associations do not all see their way to become associate members of the Senior Association, then we should arrange, at least, for the presence of delegates at all the senior meetings—particularly at the so-called "Informal" or unconventional spring meeting, where they could let their voices be heard to some purpose. Of course, there are other ways in which these various units could be linked-up and utilized for the general good; but perhaps the suggestions thrown out are sufficient for the present.

However, no matter how modern and perfect our organization may be, and no matter how capable the Council in charge of its affairs, complete and progressive success can never be vouchsafed unless each individual member and the various local organizations to which I have referred are fully prepared, as units or links in the chain of organization, to work and act in absolute harmony, and to give the object and business of the Association their earnest attention and enthusiastic support.

Personally, I see no difficulty in organizing our Scottish interests with a view to obtaining a homogeneous and thoroughly business-like Association. But meantime the central organization and its allies are not pulling in the same boat. Through prejudice and misunderstanding, the one is entirely out of sympathy with the other. We are anxious for reform; but we procrastinate and exhibit neither uniformity of conduct nor steadiness of principle. Of course, there is sentimental humbug *in pleno*, but no real bond of union. It is only when we remove the veneer, and get well behind the showy exterior, that we discover the canker which infects our organizations and prevents real union and the fusion of collateral interests. To a casual observer, it might not appear that organizations like ours were infected by indifference, jealousy, selfishness, and the like; but it is true, nevertheless. It is at least my humble opinion, and perhaps I am only giving timeous, if forceful and inelegant expression to thoughts that are already deep-rooted in the minds of others.

The absence of feeling or interest in our Association and in our status as members of a great profession, is to be regretted; but we are hopeful that our interest and earnestness may speedily revive, and that the indifference and neglect to which reference has been made *ad nauseam* will yield to the lash of our inner consciences.

Let us not conclude, therefore, that because the industry is flourishing, and because the constitution of the Association has been remodelled and endowed with every modern facility for advancing its objects and influencing development, that we have reached our goal, and that in future no effort is required to improve our status and ensure further success. Such a conclusion would be inimical to our best interests. It would spell ruin individually and collectively, and, of course, lead us straight into the outspread arms of the enemy—our rivals. There is no such thing as finality; and there being no end or limit to progress in any art, we must not close up the avenue to ambition. We must keep it open, and must for ever be adding something new to the superstructure. We must never be quite satisfied with our progress. What may seem perfect to-day may, perhaps, be obsolete to-morrow. So we must keep scheming and building all the while—not to-day only, but for the great future, with all its possibilities. And it is this thought of the future which is our inspiration. The present, with all its achievements, is not our goal; for we know that by picking up each fresh thread of opportunity as it occurs, we are always moving forward to better things. Every ideal, every ambition, every policy we embrace bears directly or indirectly on the future of the member, on the future of the Association. If anything, the future is more important to us than the present—to build without a thought, for it is like setting-up a house on marshy ground. Everything that we do, everything that we say, every word that we write, is creating a particular impression—an impression which will react upon us favourably or otherwise in the years to come.

### THE ASSOCIATION AND THE INSTITUTION OF GAS ENGINEERS.

It is to the credit of this Association that it has opened its doors wider than any other association of gas engineers, and that, by admitting principals and managers of trading firms to extraordinary membership, we are in advance of outside opinion, though not in advance of the times. We do not say that our doors are wide open enough; as a matter of fact, they must be opened still wider. But perhaps we, as an affiliated District Association, have gone far enough in this direction. We must now leave the extension of the principle in the hands of the Institution with which we are affiliated. I think the Institution, as the central organization representing the gas profession, should without delay admit to special membership distributing engineers and inspectors of lighting, commercial managers and secretaries, chairmen of gas companies, and the chairmen or conveners of municipal gas undertakings. At the same time, a real attempt should be made to raise the status and prestige of members of the profession. At present, we are simply a heterogenous mass of gas manufacturers; the title gas engineer being officially denied us. In the words of a writer in the Technical Press: "The present class of professional member should be increased only by qualified candidates; and the test of examination should be adopted as early as possible." With this, I entirely agree—believing that when such a principle is part of our constitution, we should not be long in obtaining official recognition.

A gas engineer and manager occupies a position of public trust and great responsibility; and, speaking on behalf of officers in charge of municipal undertakings, whose lot at times is anything but an enviable one (through no fault of their own), I venture to think the time is now opportune for legislation which will provide security of tenure and a suitable pension at an age when they are forced to retire from active service. In this respect, these highly technical and important public officials should not be inferior to Police and Post Office Officials. For an important pronouncement upon this subject, I would refer to a recent address to the Royal Sanitary Institute by Mr. P. C. Cowan, D.Sc., M.Inst.C.E., the President of the Institution of Civil Engineers in Ireland, and Chief Engineering Inspector Local Government Board for Ireland. He said:

> The absence of provisions in the statutes to prevent incompetent persons from acting as engineers, architects, and surveyors is much to be regretted, and doubtless accounts to some extent for the low estimate often put upon their services. But if the Institution of Civil Engineers, and corresponding institutions [such as our Institution] and the Universities were to combine in an effort to secure proper recognition of the profession of engineering, &c., success would ere long be obtained. There is no good reason why the safeguards afforded to the practice of law and medicine should not be extended to those whose function "is the art of directing the great sources of power in Nature for the use and convenience of man."

I should like to see our leading organization—the organization with which we recently affiliated—thoroughly rejuvenated and developed upon broader lines than at present. And let me add parenthetically that the Institution could study with much profit the workings of some of the Electrical, Municipal, and other Associations. In many respects these rival Associations have got ahead of us. Therefore, if we are not to fall further behind—and at the present time the Institution shows little or no inclination to re-arrange and augment its household—the affiliated Associations must jointly endeavour to change the venue and supply and

direct the driving force. We desire a central organization and a professional status worthy our great industry. Therefore, as an affiliated Association, we are intensely interested in the regenerative proposals so recently suggested by Mr. Helps, of Croydon. The seed then sown by Mr. Helps has taken a long time to germinate; but when it does take root, we hope it will develop into a strong lusty plant, worthy our great industry and its traditions. As an affiliated Association, we expect much from the Institution of Gas Engineers; and we trust we shall not be disappointed in their treatment of this momentous question.

### THE INSTITUTION PUBLICITY SCHEME.

I think it may with truth be said that we in Scotland are meantime more interested in the general question of the reorganization of the Institution from within, rather than in the question of reorganization from without; and it might have been better if this question of reorganization had been tackled and settled before launching into a great national gas publicity campaign. I believe if this had first been done, and the sympathy of municipalities obtained through membership and direct representation in the affairs of Council, there would have been a more ready response to the trumpet call of Mr. Wilson, the immediate Past-President of the Institution. Generally speaking, municipalities are not in sympathy with the endeavours of the Institution of Gas Engineers; and there is a belief that there is too much company about the Institution and too little corporation. As our Associations are at present constituted, their work is primarily in the interests of the corporations, companies, and gas consumers, and secondarily only in the interests of the member. Therefore, the duties of companies and corporations (particularly corporations) to the gas-consuming public, and also to the Technical Societies, require to be emphasized and brought home to them. How best to obtain their real sympathy and substantial support is a big question. But it will have to be tackled by the Institution if we are not to see an Association of Municipal Gas Engineers springing up in our midst. I readily admit that some of the largest corporations are sympathetic and inclined to help on the good work of the Institution and its affiliated Associations; but it must be remembered that the vast majority of corporations are never at any time disposed to help us. Knowing the demands of the Institution to be all for the good of the gas-consuming public, I have always tried to obtain the monetary support of my own Council to their schemes; but my request is always met with the remark: "No funds for such a purpose"—the Town Clerk having declared any such transaction as contrary to the Acts of Parliament by which we are governed. Now, to be met with this refusal over and over again is rather disheartening; and I verily believe many managers, not having the courage to persevere in the matter, and because of the danger of being snubbed, consign the appeals for "special purposes" funds to their already overloaded waste-paper baskets. I think the legality of such transactions is a question the Parliamentary Committee of the Institution should make a special effort to solve. It is a very important point; and perhaps a solution could best be obtained by drafting a question and arranging that it be put in the House of Commons. If the answer were that it was a legal transaction, then we would be able to quote the very highest authority when next we have to approach our Councils on behalf of the Institution's special purposes fund. But if it should be pronounced illegal, then I think it is the bounden duty of the Institution to interest our legislators in the whole question, and make a bold attempt to have such transactions legalized.

### INCOME-TAX ASSESSMENT AND DEPRECIATION.

I might touch on other matters requiring attention; but time will only permit me to say that, a few months ago, when interviewing Mr. E. S. London, of Somerset House, in connection with the vexed question of income-tax assessment and depreciation allowances, I was much surprised to learn from that gentleman that his department were unaware of the existence of such a body as the Institution of Gas Engineers. We were discussing the circular recently addressed to the gas industry on the question of depreciation, &c.; and it was while twitting him upon his department's boldness in stating that the proposed scheme had received the "assent" of the various institutions representing the corporations and companies concerned that he made the above revelation. And yet the Institution prides itself upon being very much alive! Verily, a policy of publicity is urgently required.

The statement complained about, coming from such a high source, was extremely misleading, because it conveyed the impression that gas associations, representing corporations and companies, had been consulted by the Board of Inland Revenue, and that their assent to the proposed new scheme had been obtained. But, of course, our Associations were not consulted; and it was a gross mistake for Somerset House to assume that the terms formulated and agreed upon in conference with the Municipal Accountants' Association and the Tramways and Light Railways Association only would also be acceptable to the gas industry.

This subject has now been exercising the minds of the gas engineering profession for quite a long time; and to-day, I am sorry to say, we are no more in harmony with the recent famous departmental circular than when first it was issued. As you all know, the circular intimated (contrary to the Statutes) that "no depreciation should be allowed in any circumstances in respect of any portion of these [gas] undertakings." But why gas undertakings alone have been singled out for such extraordinary treatment has never yet been explained.

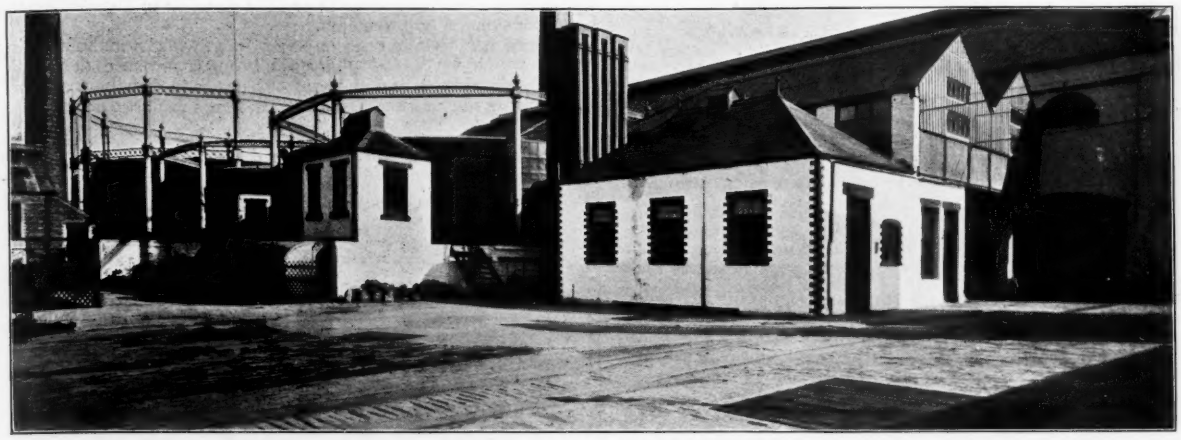
That the circular conveys instructions to surveyors which are entirely contrary to the Statutes dealing with the subject, is abundantly clear. These statutes are the Customs and Inland Revenue Act, 1878 (section 12), and the Finance Act, 1907 (section 26, subsections 1, 2, and 3). Numerous appeals have been lodged on the strength of these Statutes; and in every instance the appeal has been sustained—depreciation being allowed in accordance with the Statutes which no instructions from Somerset House can override. Other appeals are pending, because surveyors, acting upon instructions from headquarters, persist in putting the circular before the Statutes. The Department's reluctance to reconsider the validity of the circular, and to recognize facts, is an undoubted hardship to gas undertakings; and in thus forcing them to appeal, much valuable time and money are wasted.

It is of interest to note that the views and methods of surveyors differ widely; and when it comes to be a question of how much is to be allowed for depreciation, every surveyor appears to be a law unto himself—*i.e.*, undertaking A, although similarly conditioned to undertaking B, will either obtain a higher or a lower rate of depreciation than undertaking B; and again, while undertaking C is allowed depreciation, undertaking D, only eight miles distant, is allowed none. Now, all undertakings ought to be alike, in so far as percentage allowances are concerned; but the allowances differ most unreasonably and unaccountably.

Apparently there is no fixed rule to guide surveyors in regard to depreciation rates. We may refer, however, to the practice of the Local Government Board, who fix the period allowed for the repayment of loans. Their practice, I consider, is a very good guide to the "life" of gas-works plant; but, for income-tax purposes at all events, surveyors do not appear to think so. That these two Departments go to extremes, is apparent from the fact that the Inland Revenue Department allows for the life of (say) an electric cable being five times as great as that allowed by the Local Government Board. Of course, the extremes in each case operate to the disadvantage of the undertakings concerned. If it can be shown that the average life of gas-works plant, as ascertained by the period allowed for repayment of loans, is 33 years, then, when arranging allowances for depreciation for the purpose of income-tax, full regard should be given to this or any other period, and the percentage allowances calculated accordingly. At the present time, depreciation is calculated upon the diminishing value of the plant and apparatus, and not upon the original or prime cost, as it ought to be. According to the present method, the Broughty Ferry Town Council will not recover the prime cost of their gas-works plant and apparatus in 150 years; and yet, according to the surveyor's own showing, the average life of the plant is 32·6 years! Take £100 as the original cost and a 20 years' life. A 5 per cent. rate on the diminishing value at the end of the twentieth year, leaves a balance of £37 14s. The residual value is thus about one-third, and much too high. A rebate of 10 per cent. on the original cost would exhaust the value in ten annual instalments. But a rebate of about 16½ per cent. would be required to exhaust the value in ten years if calculated on the diminishing value. There should also be allowances for unexhausted depreciation and for obsolescence, in accordance with the correspondence of 1879 between the Association of Chambers of Commerce of the United Kingdom and the Right Hon. Sir Michael Hicks Beach, Bart., M.P.

I have no doubt the circular referred to was issued with a view to obtaining uniformity of practice; but I am afraid uniformity may not be obtained unless responsible Gas Associations, acting on behalf of the gas industry, are permitted and encouraged to co-operate with the Somerset House experts. If negotiations were now opened up between these authorities, I am sure a uniform and equitable scale of depreciation allowances for all kinds of gas-works plant and apparatus could be arranged. But at the same time, we should not overlook the fact that the law relating to the valuation of gas undertakings (particularly municipal undertakings) for income-tax and local assessment purposes, is in a state of chaos and much in need of amendment. The assessor in our district, conforming to his instructions, refused to consider our claim for depreciation, with the result that we took the matter before the Local Commissioners, and they sustained our appeal, granting depreciation allowances in accordance with Appendix I. Of course, it should be borne in mind that it is not in the interests of every gas undertaking to claim annual depreciation allowances. Some prefer to continue to obtain renewal, &c., allowances; and probably this accounts for there not having been a more general outcry against the recent attempt to alter the Statutes by departmental interference. But it would certainly be much better if uniformity of practice prevailed.

The other week we had an opportunity of adjusting our local assessment valuation, and perhaps Appendix II., showing how our valuation is arrived at, may be of interest. I could not persuade the county assessor to allow as tenant's capital (1) surplus general stores in hand and (2) cooking-stoves. But I consider these stores just as essential as surplus coal and oxide stores. The assessor, however, would not admit the necessity for surplus stocks, in view of the fact that five-twelfths of the total expenditure had been allowed. Of course, we did not deem it wise to meantime press the point. Then we all know the value of cooking-stoves, and how much they are responsible for increasing the revenue, and, of course, the rateable value also, seeing the basis of our valuation is the gross profits. But until the Kirkcaldy case is reversed, we may not be able to claim cooking-stoves as tenant's capital. It might interest you to know that while gas



undertakings only obtain a 5 per cent. allowance on tenant's capital electricity undertakings obtain 10 per cent.

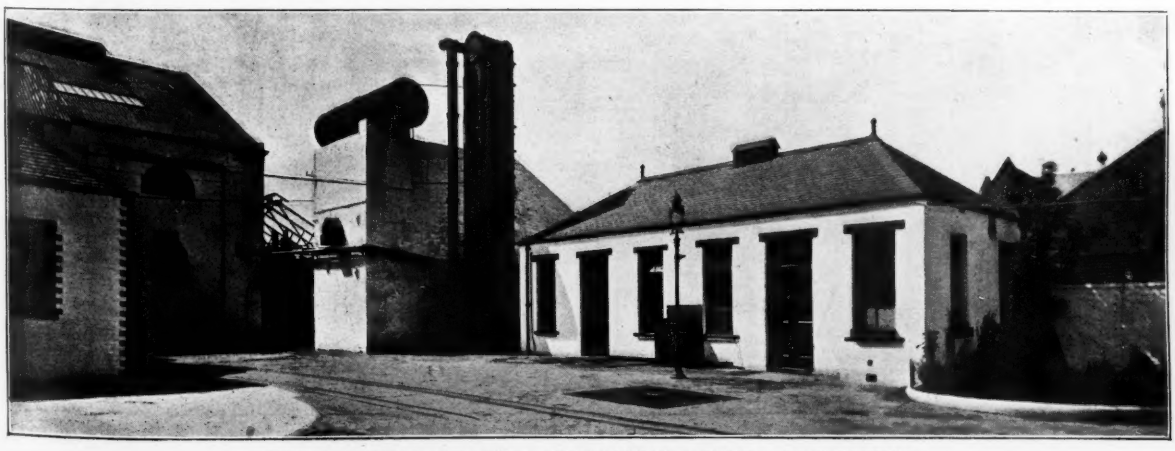
The recent action of the Inland Revenue authorities in trying to force us to adopt their departmental-made law is on all-fours with the methods of other Government Departments, whose dictatorial manner is being strongly resented. Not later than April last, at the annual meeting of the Convention of Scottish Burghs held in Edinburgh, much all-round displeasure was voiced at the growing intervention and interference of permanent Government officials in local affairs.

GAS-WORKS RESULTS AT BROUGHTY FERRY.

Not being able to claim anything extraordinary in the working results obtained, I must refrain from going deeply into the affairs of the department under my charge. At present we are supplying gas of 18·58-candle power, tested by the No. 2 Metropolitan test-burner; and the calorific value, tested by the Simmance-Abady calorimeter, is 588·39 B.Th.U. net. Prior to the introduction of a retort-house governor, we had considerable trouble in keeping the quality of the gas steady; but now, thanks to this most valuable piece of retort-house apparatus, the variation in the quality from day to day is scarcely perceptible on the photometer. We find it best to work with ½-inch seal and 3-10ths vacuum in the hydraulic main. Our retort-house is fitted with machinery comprising coal-breaker, gravity bucket conveyor, West's manual charging and drawing machines, and a 2-feet gauge tramway, with suitable haulage gear and side-tipping waggons for handling the coke. All coal is carted from the railway sidings and tipped into a ground-floor hopper (or the coal may be first passed through the coal-breaker), and thence conveyed either to the stores or to

a series of overhead storage hoppers, from which it gravitates to the charging machine. After my appointment to Broughty Ferry, it was my first duty to have the retort-house equipment overhauled, improved, and extended; but, taking everything into consideration, I am of opinion that the Broughty Ferry Gas-Works, being too small, is not suited for the most economical use of retort-house machinery. However, the machinery having been installed, it had to be made the most of. The purification of our gas is effected entirely by oxide of iron; and the average cost of purification amounts to 0·23d. per 1000 cubic feet of gas sold. As far as possible, we accomplish revivification *in situ;* and if I judge correctly. the Burkheiser and Cheltenham processes may soon revolutionize our present methods of purification. Nowadays nearly every gas-works has sulphate of ammonia plant; and at the present price of sulphate, every works could afford to work up its liquor. We obtain fairly good results from our plant. But, unfortunately, we cannot say the same about our coke results. Compared with others, our results are not good; but by gradually introducing a new type of furnace and regenerator, we hope ere long to improve our fuel results. We have the satisfaction, however, of knowing that we supply steam-quenched coke; and anyone who has taken the trouble to test the *aqua*-absorbing capacity of coke will appreciate the ease with which coke results can be manufactured. I think every gas undertaking, whether it produces sulphate of ammonia or not, should heartily support the good work of the Sulphate of Ammonia Committee.

I believe in keeping a tidy and orderly works, and in spending annually a good round sum on the general repair and maintenance of the plant. Even a gas-works can be made and kept a beauty spot. After much disappointment and hard work, I have trans-



THREE VIEWS OF THE BROUGHTY FERRY GAS-WORKS.

COKE PRODUCED—YEAR 1910-11.

Total coke dry (calculated from full-charge tests of all kinds of coal used) . . . . . 4273 tons.
Do. Average per ton of coal used . . . . . 12·28 cwt.

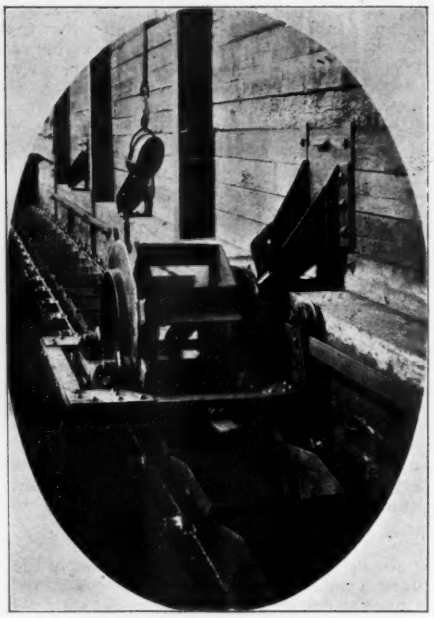
| | Tons. | Per Ton of Coal Used. | Per 100 Lbs. Coal Used. |
|---|---|---|---|
| Coke sold per steelyard—(allowing for stocks) | 2452 | = 7·05 cwt. | 35·23 lbs. |
| Coke used in furnaces, dry—(number of charges per annum × average weight) | 1393 | = 4·00 ,, | 20·02 ,, |
| Coke and breeze used in boilers—(number of charges per annum × average weight) | 739 | = 2·13 ,, | 10·62 ,, |
| | 4584 | = 13·17 cwt. | 65·87 lbs. |

formed engineering and financial chaos into something like order; and now I am satisfied with the progress made, despite the fact that the Municipality owns a competitive lighting and power business. Of course, it is an old story—the story of the milk cow and the calf; and, like many another, our gas undertaking has also had to yield of its strength to support the pet child of the burgh—the electricity department. I think it is nothing short of a national scandal that municipal gas undertakings should be compelled by law to finance and make good the intentionally created losses of their business rivals; and I can only say that the amendment of the Electric Lighting Acts is much overdue. A town of 11,000 inhabitants cannot satisfactorily support two "lighting" industries; and it being the desire of my Council to see the electricity department firmly established upon a paying basis, no attempt has been made to prevent the new lighting industry from obtaining business at the expense of the old. In large towns, a competitive policy is productive of good results; but such a policy would not do in Broughty Ferry. In pursuance of a competitive policy, we would undoubtedly regain customers, and to a larger extent prevent the migration of others; but our gains would probably become a serious menace to the credit of the sister department, and that is a phase of the question little to be desired. All things considered, I am afraid it is the fate (if not the duty) of our Gas Department to continue to mother the youngster.

THE OUTDOOR DEPARTMENT OF GAS-WORKS.

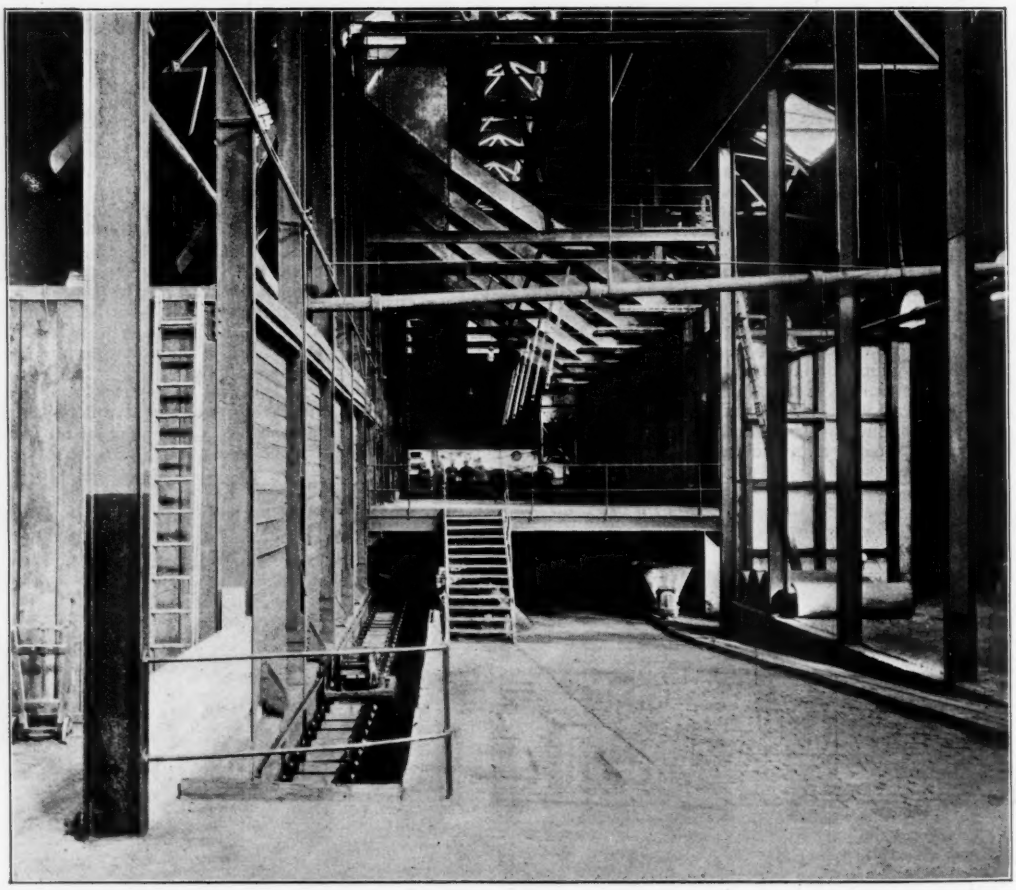
I attach great importance to the distributing department; and ever since the introduction of the Welsbach light in 1891, it has been evident that a revolution in our outdoor methods was bound to come. This revolution has even now begun; and seeing it is already possible to produce over 12,000 cubic feet of combustible gas from a ton of coal in old-fashioned retorts, the desire to further increase "makes" should be given a rest, and more attention should be concentrated upon the question of distribution and our consumers' requirements.

There is a certain reserve power in gas-works manufacturing plant which we would gladly see brought into use during the hours of daylight, and it being our desire to distribute as much gas during the daytime as during the hours of darkness, anything



**The Rotary Coal Filler.**

calculated to encourage the day use of gas should be seriously considered and adopted. The question of the uses to which gas may be put during daylight hours is of paramount importance to all gas undertakings; and when we look around and see how far the largest concerns have had to go in an earnest endeavour to maintain their place as the principal purveyors of light, heat, and power, we can only marvel how some of the slow-moving concerns



**Interior of the Retort-House at the Broughty Ferry Gas-Works.**

have not been snuffed out long ago. The ingenuity and completeness displayed in advertising and in door-to-door interviewing, &c., command respect; and even the smallest undertaking must emulate their example. Such work is not undertaken for amusement. It is a serious attempt to foster day consumption, alike for the benefit of the undertaking and the consumer. There are municipalists who deprecate an advanced enlightened policy, and their parochial ideas clog the wheels of progress. In it, they espy the bogey of municipal trading. But there is no other road to success; and ultimately they must admit its utility. My own opinion is that a municipal gas department should always be run upon strict commercial lines, without regard to partyism, and its resources fully developed in the interest of communism.

Like other progressive undertakings, we give our customers every modern attention, and we treat them all with politeness and respect. Our services are at their disposal night and day. We provide and fix a variety of cooking-stoves free of cost, and we sell and fix gas-fires and lighting appliances at very moderate rates. Then, in the joint interest of buyer and seller, we test all meters once at least in five years. It has been suggested more than once that the Sales of Gas Act is entirely out of date, and that in view of present-day requirements and future developments in the distribution of high-pressure gas, amendment is immediately necessary. But as yet we hear of no steps being taken to bring this highly important matter under the notice of the authorities. In reform of this kind, the Institution of Gas Engineers might well follow the example of the young Canadian Gas Association.

### THE INDUSTRY IN THE FUTURE.

We hailed the passing of the Standard Burner Bills with pleasure, and took it as a sign of the times. But if we could only obtain, in as simple a way as the Canadian gas engineer, the universal adoption of the No. 2 Metropolitan test burner and a level candle-power standard for the whole country, the supply of constant pressure at the consumers' meters, and uniformity in the construction of incandescent burners, what an impetus it would give to the gas industry. What a tremendous advantage it would be to have unvarying pressure night and day, and burners made to give maximum results under standard supply conditions applicable to the entire industry.

Then the potentialities of high-pressure gas are so great that in time it is bound to further revolutionize lighting and heating. Therefore, with vertical retorts in general use, with high and low pressure gas on tap, and with the principles of surface combustion applied wherever it is of service, who will predict the position of the gas industry when the Centenary Anniversary of the North British Association falls to be celebrated in 1961?

In the great and ominous fight which looms on the horizon of the rival illuminants, economy of production and distribution and low-priced gas are the main essentials to success. Therefore, build for the future, husband your resources, and let your capital expenditure be judicious and timely.

At no time in the history of the industry has a united front and perfect organization of our forces been more vital to our best interests than at present. Every worker now belongs to some Union or other; and if "Union" truly means "Strength," does it not seem strange that we, who are so continually being asked to recognize unionism in others, should so pointedly fail to recognize the necessity for unionism in our own ranks? Little wonder that the gas engineering profession and its Associations have so long failed to obtain the public and Government recognition their great services to the country warrant.

When Maurice de Guerin began a subject, his self-conceit imagined he was doing wonders; and when he had finished, he saw nothing but a wretched made-up imitation, composed of odds and ends of colour stolen from other people's palettes, and tastelessly mixed together on his own. Gentlemen, now that I have finished, I am similarly minded about my address; and I thank you for your great patience and indulgence.

## APPENDIX I.

### BROUGHTY FERRY GAS DEPARTMENT.

*Return to the Property and Income-Tax Commissioners, 1911-12.*

INCOME.

| | | |
|---|---|---|
| Sale of gas | £8,249 14 9 | |
| Residual products | 2,711 7 2 | |
| Other revenue | 1 10 7 | |
| | | £10,962 12 6 |

EXPENDITURE.

| | | |
|---|---|---|
| Manufacture of gas | £6,256 5 0 | |
| Distribution of gas | 793 2 9 | |
| Rents, rates, and taxes (exclusive of income-tax | 598 17 3 | |
| General administration | 176 12 1 | |
| Other expenditure | 161 13 5 | |
| | | 7,986 10 6 |
| | | £2,976 2 0 |
| Deduct depreciation as undernoted | | 930 0 0 |
| Rateable value, 1911-12 | | £2046 2 0 |

*Valuation at May 15, 1911.*

| | Percentage Deductions. 2½ per Cent. | 3 per Cent. | 5 per Cent. | Total. |
|---|---|---|---|---|
| Valuation at May 15, 1910 | £19,847 | £4,276 | £6,120 | £30,243 |
| *Less* depreciation | 496 | 128 | 306 | 930 |
| | £19,351 | £4,148 | £5,814 | £29,313 |

Classification of Deductions.

At 2½ p.c.—Retort-bench, fittings, foul main, condensers, scrubber and washer, purifiers, station meter, governors, gasholders, carburettor, engine and pumps, mains and service-pipes.
At 3 p.c.—Consumers' meters.
At 5 p.c.—Charging and drawing machinery, conveyors, elevators, engines, coal breaker and fillers, coal and coke hoppers, tramway and haulage gear, waggons, steam cranes and derricks, engines and exhausters, pumps, boilers, workshop tools, &c.; sulphate plant, gas-stoves.

Suggested Classification of Deductions.

At 3 p.c.—Retort-bench, fittings, foul main, condensers, scrubber and washer, station meter, governors, gasholders, carburettor, engine and pumps, mains and services.
At 4 p.c.—Consumers' meters.
At 5 p.c.—Charging and drawing machinery, conveyors, elevators engines, coal-breaker, fillers, coal and coke hoppers, tramway and haulage gear, waggons, steam cranes and derricks, engines and exhausters, purifiers, pumps, boiler, workshop tools and implements, sulphate plant.
At 10 p.c.—Cooking-stoves and gas-fires.

## APPENDIX II.

*Valuation of Broughty Ferry Gas-Works for Local Assessment Purposes, Year 1911.*

| | | | |
|---|---|---|---|
| Total receipts | | £10,963 | |
| Total expenditure | £7,986 | | |
| *Less* owners' rates and feu-duty | 202 | | |
| | | 7,784 | |
| | | | £3,179 |
| Tenant's capital— | | | |
| *Working expenses, 5-12ths of £7784 | | £3,243 | |
| Six weeks' stock of coal and enriching material, calculated upon the maximum daily requirements | | 957 | |
| Surplus purifying material | | 150 | |
| (*a*) Surplus stores in hand | | 500 | |
| Tools, implements, and waggons | | 750 | |
| Machinery, stoking, &c. | | 3,000 | |
| Office and laboratory furniture | | 250 | |
| Meters in use and in stock | | 6,500 | |
| (*b*) Stoves in use and in stock | | 3,500 | |
| | | £18,850 | |
| (*a*) Disallowed stores in hand, as above | £500 | | |
| (*b*) Disallowed stoves, as above | 3,500 | | |
| | £4,000 | | |
| Tenant's capital claimed | 18,850 | | |
| ,, ,, allowed | £14,850 at 5 p.ct. | | 742 |
| Valuation for year 1911 | | | £2,437 |

(Accepted by the Assessor, 16/8/11.)

* The Assessor in other cases allows half working expenses.

Note.—In the case of companies, an additional 20 per cent. is allowed as tenant's profits.

## APPENDIX III.

*Cost of Carbonization with Manual Stoking Machinery.*

| | Five Years' Average. Per Ton of Coal Used. s. | d. | s. | d. | Per 1000 C. Ft. of Gas Sold. d. |
|---|---|---|---|---|---|
| Cartage of coal from waggon to elevator hopper | .. | | 0 | 4·80 | 0·55 |
| Elevator men's wages (breaking and storing coal, and proportion of foreman's time) | 0 | 1·90 | .. | | 0·21 |
| Stokers' wages (including removal of coal to bing, furnace cleaning, pipe-jumping, and proportion of foreman's time) | 1 | 7·18 | 1 | 9·08 | 2·18 |
| (Ashes removed free of cost.) | .. | | 1 | 9·08 | 2·39 |
| Repairs and maintenance of coal plant—wages and material | 0 | 1·23 | .. | | 0·14 |
| Do. of coke plant—wages and material | 0 | 0·51 | 0 | 1·74 | 0·06 |
| Interest at 3½ per cent. | 0 | 3·42 | .. | | 0·39 |
| Sinking fund, 1-20th | 0 | 4·88 | 0 | 8·30 | 0·56 |
| | .. | | 2 | 7·12 | 3·54 |

| Results during Maximum and Minimum Demand. | | |
|---|---|---|
| Average of two winter months—Nov. 15 to Jan. 15. | | |
| Stokers' wages (men nearly fully employed) | £121 3s. 10d. | 1s. 5·36d. |
| Coal carbonized per man per shift . . cwt. | 68·66 | .. |
| Gas made do. cub. ft. | 33,373 | .. |
| Average of two summer months—May 15 to July 15. | | |
| Stokers' wages (men not fully employed) | £69 14s. 5d. | 2s. 3·31d. |
| Coal carbonized per man per shift . . cwt. | 50·22 | .. |
| Gas made do. cub. ft. | 23,940 | .. |

Mr. S. Milne (Aberdeen) said that the very pleasant duty fell to him to propose a vote of thanks to the President. He was

sure he voiced their thankfulness when he said that they had had that day a first-rate presidential address. It was fitting that at this, the fiftieth anniversary of the Association, meeting they should have a brief résumé of the history of the Association. The résumé presented to them by the President had been full of information of a most interesting character. They joined with the President in his tribute to the memories of the founders of the Association. They could not but be struck with the characteristic zeal and enthusiasm which pervaded the whole address. This characteristic had been exemplified in the history of Mr. Keillor's connection with the Association. In his own works, in the words of his address, he had been engaged in remodelling the fabric and improving and perfecting the arrangements he found there. No one had done more, in recent years, than Mr. Keillor had in that direction, or in improving and perfecting the arrangements of the North British Association. They were all agreed, he was sure, on this point. His address also contained words of correction and reproach; he was happy to say words, also, of encouragement. If the ideal to which the President had pointed that day, of linking together the Association, the Informal Meeting, the Junior Associations, and the Commercial Sections, could be consummated, he was sure that it would be for the good of the gas industry throughout Scotland. It was unfortunate that the President's address was not open for discussion, else they might have had some light thrown upon various subjects. He was afraid the only way in which this might take place would be in those other bodies—the Junior Associations and the Commercial Sections—applyng for admission to the North British Association.

The motion was agreed to unanimously.

The PRESIDENT thanked Mr. Milne for his very kind allusion to himself, and the meeting for their overwhelming applause. He could assure them that a month ago, when he began to make some notes as to what shape his address should take, he was in "Queer Street," and particularly when they had the intimation from Dr. Colman that he could not lecture; and, in addition to this, nobody whom they had asked was willing to offer any communication. At that time he thought he would have to prepare an address which would occupy from half-past ten till four o'clock in the afternoon. He might not have been equal to the occasion. The address, he feared, was rather long; and he apologized for it on that account.

### THANKS TO THE WILLIAM YOUNG MEMORIAL COMMITTEE.

Mr. W. B. M'LUSKY (Perth) proposed that they record their thanks to the William Young Memorial Committee for the work they had done in preparing the scheme of commemoration. While the President had modestly made complaint with regard to the inertness of the members of the Association, he thought that the programme before them, and the result of the President's own influence, showed that a great deal of work had been done by the Committee. The Committee had certainly completed a very important work. The William Young Memorial Fund would certainly go down to posterity as a most important item in all the work of their very capable Committee. He need not enlarge upon the work the Committee had done, because it was very well recorded in the annual report. But he would draw their attention to the broad basis upon which the whole scheme had been launched. There was no possibility, he thought, of anything arising in connection with the development of gas activity which would not be covered by the scope of the Deed of Declaration of Trust. He noticed that the scope covered the production, application, and distribution of gas, and all matters relating thereto. It also covered the production of mineral oil, the conduct of mineral oil undertakings, and all matters relating thereto. Looking into the deed, they would see that it did not cover anything in connection with the application and distribution of oil. This showed that, while the Committee had launched a scheme of the very broadest, they had been most careful to define the limits of the scheme, so that there was no possibility of a lecturer giving them a discourse demonstrating the value of paraffin oil for lighting purposes, or engaging an expert to canvass the use of oil among gas consumers. He wished to show that the Committee had been very careful to relieve their successors from any trouble in regard to the working of the William Young memorial scheme. He need not endeavour to impress upon them the value of the work done by the Young Memorial Committee. He believed that the work of commemorating the name of the great man was worth the amount which had been subscribed. The Committee had had the assistance of Mr. Yuill and Mr. Napier; the Committee had, indeed, been composed of men of a variety of gifts, and they had done their work exceedingly well.

The proposal was adopted unanimously.

Mr. J. W. NAPIER (Alloa), on behalf of the Committee specially appointed to get up a fund for commemorating the name of Mr. William Young, said he desired to thank them for their vote of thanks. They ought specially to give thanks to the North British Association, who gave fully £100 from the Research Fund of the Association, and more especially when they remembered that the Research Fund was an account which was very seldom drawn upon. The gift was all the more valuable because of the object to which it was put. The desire of the Committee in formulating the scheme was not only to bring before the members of the Association the valuable work of William Young, but rather, he thought, to perpetuate the memory of a man whose individuality was so particularly strong and so striking. The President had that day found fault with the Association for not being sufficiently available for serving the ends of their industry; but he was strongly of opinion that no body of men could ever be looked upon as the proper or correct medium from whom benefit would accrue, either to the individual or the industry. They had a powerful example of this in the case of Mr. Young, who had benefited their industry and other industries, by the power of the individual. He hoped that the valuable appreciation of William Young by Dr. Daniell might be bound in more worthy covers, so that it might be put on the market, and members of the industry be thereby given the advantage of having it in a more permanent form. Dr. Daniell's appreciation was not only of very considerable value in itself, but it was a technical treatise which, in many respects, covered much other work which had resulted in great success, as the outcome of past labours. When William Young got his patent for a vertical retort plant, many years ago, and gifted it to the shale-oil industry, he undoubtedly gifted it to the gas industry as well; and yet it was a striking fact that all these years they had not taken advantage of it, because, so far as he was able to judge, the vertical retort of William Young's original patent was, to all intents and purposes, the vertical retort which they had to-day.

### READING OF PAPERS.

The reading of papers was then proceeded with. These were taken in the following order: "Notes on the Attitude of the Air Question in Relation to Gas Manufacture, Purification, and the Reduction of Quality," by Mr. William Key, of Glasgow; "A Short Experience with Vertical Retorts at Helensburgh," by Mr. William Blair, of Helensburgh; "The Need of Publicity"—a discussion upon which was introduced by Mr. W. M. MASON, of Glasgow, and Mr. J. NAPIER MYERS, of Saltcoats.

### ELECTION OF OFFICE-BEARERS.

The result of the ballot for the election of office-bearers was intimated by the President, as follows:—

*President.*—Mr. S. Milne, of Aberdeen.
*Vice-President.*—Mr. D. Vass, of Airdrie.
*Members of Council.*—Mr. A. Mackay, of Montrose, and Mr. J. Lang, of Alexandria.
*Auditor.*—Mr. D. Spalding, F.S.A.A., of Glasgow.

Mr. J. NAPIER MYERS (who had been announced as being elected on the Council), intimated that he could not accept the honour which had been offered him, on account of the terms of his appointment at Saltcoats.

The PRESIDENT said there was a tie between Mr. John Lang, of Alexandria, and Mr. A. Masterton, of Edinburgh, who were next on the list. In terms of the rules, a lot was drawn, which fell upon Mr. Lang, and he was accordingly declared elected.

Mr. MILNE thanked the members very heartily for the high honour they had conferred upon him in electing him President of so venerable an institution. He should endeavour, he said, to make it his business to maintain the traditions of the Association; and he trusted that, with the co-operation of every member, the year they were about to enter upon might not be the least successful of the fifty years which had preceded it. In a few minutes, he continued, they would be called upon to decide the place of meeting for next year. He did not know what their views might be; but he would like to take this opportunity of saying that, during the fifty years of the Association's existence, there had never been a meeting of the Association held further North than Broughty Ferry, where the Association met in 1863. Their fellow-members in the North-East of Scotland would, he was sure, take it as a very high compliment if they decided to go to Aberdeen next year. And would they allow him to say that, at a meeting the previous Monday, the Aberdeen Town Council heartily and unanimously authorized him, in their name, to invite the Association to visit their fair city—"the Silver City by the Sea"—on the occasion of their meeting next September.

### PLACE OF NEXT MEETING.

The PRESIDENT proposed, and Mr. WALTER GRAFTON (Glasgow) seconded, that the annual meeting of the Association next year be held in Aberdeen.

The proposal was very cordially agreed to.

### VOTES OF THANKS.

Mr. D. ROBERTSON (Dunoon) proposed a vote of thanks to the readers of papers.

This was agreed to.

Mr. W. B. M'LUSKY (Perth) moved a vote of thanks to the Aberdeen Town Council for their very kind invitation.

Mr. W. EWING (Lochgelly) seconded, and the motion was adopted with unanimity.

Mr. DANIEL MACFIE (Edinburgh) moved a vote of thanks to the Auditor and the Scrutineers.

This was seconded by Mr. A. MACKAY, and agreed to.

Mr. A. MACKENZIE (Edinburgh) moved a vote of thanks to the Hon. Secretary and Treasurer, which was also agreed to.

### THE PRESIDENT'S MEDAL.

Mr. A. WADDELL (Dunfermline), as Past President, presented Mr. Keillor with the President's medal of the Association.

The PRESIDENT, in returning thanks, spoke of the pleasure he had had in serving the Association, and expressed his willingness to do all that he could for it.

The proceedings terminated at five o'clock.

### Annual Dinner.

In the evening the members and their friends, including many ladies, dined together in the Atholl Restaurant in the Scottish Exhibition. Mr. Keillor presided over a body of about 150. The toasts honoured were: "The Institution of Gas Engineers," proposed by Mr. A. Yuill, and responded to by Mr. R. G. Shadbolt; "The North British Association of Gas Managers," proposed by Mr. D. Macfie, and acknowledged by Mr. G. R. Hislop, of Paisley; and "The President," proposed by Mr. A. Wilson, and responded to by Mr. Keillor.

Mr. Hislop, in the course of his remarks, said they had imposed on him the very important and onerous duty of responding to the toast of the evening, and especially upon so unique an occasion as the Jubilee of the Association. He premised this was on account of his being probably the oldest member of the Association, or that he happened to be the only member living who had been three times President. His connection with the Association went back about forty-four years; and, needless to say, very many of his friends in the gas profession had come and gone within that time, circumstances which impressed one with the evanescence of human life, and the fleetness of time. Happy associations clung to the memory, as did the friendly intercourse and discussions he had had with those long since gone to rest. He could only name a few—such as Hugh Bartholomew and William Foulis, of Glasgow; John Reid and F. T. C. Linton, of Leith; Boyd M'Crae, and his son John M'Crae, of Dundee; John Young and G. F. Cusiter, of Dalkeith; Alexander Smith, of Aberdeen; Thomas Whimster, of Perth; Robert Mitchell, of Edinburgh; Samuel Stewart, of Greenock; James M'Gilchrist, of Dumbarton; Peter Watson, of Stirling; William Mackenzie, of Dunfermline; George Malam, of Dumfries; Samuel Dalziel, of Kilmarnock; Jesse Hall, of St. Andrews; Alexander Scott, of Galashiels; and William Clazy, of Kelso. He could not omit the names of Mr. D. Bruce Peebles and Dr. Stevenson Macadam, of Edinburgh; Dr. William Wallace, of Glasgow; and Mr. Henry Aitken, of Falkirk—all of whom rendered valuable service to the Association. Among the living, besides himself, he thought that his friends Mr. Key and Mr. Macpherson (of Kirkcaldy) would be the oldest members. Pre-eminently there stood the name of the deceased William Young, of Peebles, who, as had been said, was the most valuable asset the Association ever possessed, during the long period of its existence, and regarding whom they were all greatly indebted to Dr. Daniell for his admirably written appreciation. Many a subject had passed through the refining furnace of debate during the bygone fifty years; and not a little share of the refining process fell to their dear departed friend, Mr. Young. After passing through the high-candle-power era, during which all the rich cannels and shales in the country were exhausted, necessity became the mother of invention, and Dr. Auer von Welsbach, in 1884, startled the world by his incandescent mantle, and completely revolutionized the gas industry—introducing, as it did, the present era of low-quality gas, and that at the critical moment when electricity was making a strong bid for supremacy. And now, while Dr. Auer von Welsbach had advanced electric lighting by 60 per cent., he had previously given to gas an increased lighting power of over 500 per cent., raised subsequently by high pressure to 1000 per cent., thus giving a position to gas which no rival in the world was ever likely to approach. The retrospect called for thankfulness on the part of gas engineers and shareholders alike, as it amply justified the combined efforts of this and all other like Associations in the past, in placing the gas industry in the invulnerable position in which it now stands. It was some satisfaction to reflect that the North British Association of Gas Managers was the pioneer in combining effort, by its formation, to further the magnificent success now secured for the gas industry. But however much credit might be due to the members of the Association in the past days, it was no warrant for laxity in the future. Having now placed the flag of victory on the mountain top, and within sight of the opposing forces, they must keep it intact, and hand it down to a succeeding generation, to inspire it with the spirit of progress in maintaining the supremacy of gas as a necessity of human life—for lighting, heating, and motive power. He trusted, therefore, that the Association might long maintain a vigorous existence; and that all that was good might attend it in the future.

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On Friday a large party proceeded, in indifferent weather, on an excursion by rail and steamer to Arran, *viâ* the Kyles of Bute.

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**Gaseous Explosions Committee.**—At the meeting of the British Association, there was submitted an interim report of the Committee (of which Sir W. H. Preece is Chairman and Mr. Dugald Clerk and Professor Bertram Hopkinson are Joint Secretaries) appointed for the "Investigation of Gaseous Explosions, with Special Reference to Temperature." It was stated that during the session 1910-11 the work of the Committee was continued; but from various circumstances—partly breakdown of apparatus, and partly pressure upon the time of various investigators—only two "Notes" have been read. Three meetings have been held, and have been excellently attended. The "Notes" presented and discussed were by Mr. Dugald Clerk; and by Professor E. G. Coker. A great deal of other work is in hand, which will be included in a full report which it is intended to give to the Association next year.

## THE NEED OF PUBLICITY.

**[A Discussion by the North British Association of Gas Managers, introduced by Mr. W. M. Mason, and Mr. J. Napier Myers.]**

Mr. Mason, in introducing the subject, said it was with very great diffidence that he came before them, because he was not even a member. But he was a member of a body which endeavoured to impress upon its members the necessity for taking part in the work of the Association—he meant the Junior Gas Association.

One of the nation's thinkers has expressed the opinion that the lack of enterprise in much of our social and commercial life is to be traced to the deep-seated reverence Britishers have for precedent, and to the strong objections even those designating themselves "liberal" have for new methods. Perhaps in no business is this more apparent than in the gas profession; and, at the risk of "falling foul" of older and more experienced gas men, I venture to express the opinion that many of their methods, as far as the commercial side of the business is concerned, are hopelessly out of date. Some gas engineers seem to hang tenaciously to the ancient maxim that "profits are made in the retort-house," and forget that, even if the proverb is true, profits so made might easily be turned to losses if other sections of the business are not as efficiently handled.

### The Publicity Scheme.

It is a hopeful sign of the times that some gas managers are really wakening to the need for more energetic steps being taken to put the sales side of their business on better lines. The "Publicity Scheme" formulated by the Institution of Gas Engineers, and now within the realm of accomplished fact, is a distinct advance in the way of combined effort; and if for nothing else than arousing interest among gas authorities, and focussing attention on the need for united and strenuous action, the scheme would have more than justified its inauguration. I think a good motto for the new organization would be "Wake, Brethren, Wake!" with the telegraphic address, "Hustle."

The scheme, as stated in the circular sent to the various gas authorities, aims at being "primarily a campaign in favour of gas;" but its essential feature is that it is a co-operative movement, and an earnest endeavour to bring the forces of progress into unity. Some of the more enterprising gas undertakings are already spending large sums in advertising, from which doubtless others have benefited; and it seems only fair—apart altogether from the importance and urgency of the question—that all interested should lend a hand, in no matter how small a degree, to help "the old chariot along." It is difficult to understand the attitude adopted by some engineers, who take exception to the scheme because of the annual subscription basis; but surely £5 per annum to a 40-million works cannot be called extravagance, and the stimulus to business is certain to be felt by the entire gas industry.

A sentence in a recent technical publication hits the nail on the head. The reference is to the old-fashioned methods of some gas companies, and is as follows:—

> Neither they nor their chief officials have been trained to spend money by way of advertisement. So far as the gas engineer and manager's experience goes, it has all lain in the direction of saving money, not of lavishing it. He may be able to appraise the economy of an elevator or conveyor for his coal or coke; but he is quite at sea as regards the value of advertisement. The bare proposal to throw bread, or its equivalent, upon the waters, and look to its profitable return after many days is abhorrent to all the frugal traditions in which he has been brought up.

The editor might have added that the modern Scottish version of the wise man's proverb was "Never cast your bread upon the waters unless the tide is coming in."

### Electricity Enterprise.

If justification for publicity were necessary, one need only refer to the enterprise of our rivals in the electricity camp. Let us take an illustration that lies very near some of our own doorsteps. I refer to the Clyde Valley Electric Company. I fancy it would be an eye-opener to us if the advertising bill for this one concern were available. Money and effort have been liberally expended, with the inevitable result that, within a comparatively short period, a very large business has been developed. The point for us is that this business is not obtained from customers who had no light or power before, but is, as a matter of fact, almost entirely the result of direct poaching on what we fondly imagined to be gas preserves. Some of the methods employed have been contemptible, and many of the statements (or misstatements rather) regarding economy, values, &c., have been on the usual electricity lines. But fairly or not, the fact remains that gas undertakings in this district are suffering serious loss, not because of the greater merits of electricity, but simply because of the persistent manner in which it is being forced on the attention of the public, or, to put it bluntly, because the Clyde Valley Company promoters are running their business on up-to-date lines, instead of sitting still and deploring dull times.

We, of course, are firmly convinced that there is nothing like gas; that it is the cheapest, best, and most reliable, and all the rest of it. But the general public have a way of believing and

supporting men who are not ashamed to proclaim their wares, and who insist that their product is unquestionably the finest thing on earth. There is nothing dishonourable regarding the manufacture and sale of gas, and the uses for which it is now available are legion. But the great majority of people know nothing of this—many of them in fact know nothing of even its commonest and most apparent advantages; and unless they are informed, unless indeed the information is persistently forced on their notice, we cannot hope, in face of the well-organized efforts of our competitors, to even retain the business we have. A short extract from the speech of the Chairman of the Electric Supply Publicity Committee last June proves my contention. The reference was to the previous year's efforts. The statement was to the effect that—

> The result had been satisfactory from every point of view; and the Committee had supplied literature throughout the United Kingdom in addition to the Colonies and abroad—the total sales during the year numbering nearly one-million-and-a-half. Further, the Committee had also done signal service in connection with the newspapers, and the various erroneous reports which had been given currency to in the Press in regard to the cause of fires. Corrections had been arranged in the Press wherever necessary, and the interests of electric supply generally upheld. Newspaper advertising had also been done to a fair extent; and there was hope that in the forthcoming year this would be carried on on a much larger and more comprehensive scale. He upheld the necessity of a strenuous and systematic publicity campaign, as preparing the way for and supplementary to personal canvassing. The universal use of electricity for lighting, power, and the various domestic uses could be attained only by continuous appeal. The supply undertaking must regard themselves as vendors of a commodity in exactly the same way as other tradesmen; and the methods of widespread advertising adopted by the latter were as indispensable to the one as to the other.

Or take this paragraph from last month's issue of one of our most popular magazines ("Chambers's Journal"):

> Owing to the greater display of enterprise that is now being evinced by electricity generating corporations, in conjunction with inventive effort, the advantages of cooking by electricity are being brought more forcibly before the housewife.

### New Methods Needed.

Now there is little use criticizing the methods of our rivals, and waxing eloquent about their imaginative powers. What we want is to fight them on their own publicity grounds; and this I have good reason for knowing is the last thing they wish us to attempt. We need not fight with their weapons of misrepresentation; for the claims made on behalf of gas are usually not exaggerated, and can be easily authenticated. "Facts are chiels that winna ding." But if these fact are kept to ourselves, they will not add much to our output.

We are well aware that those with conservative ideas excuse their lack of enterprise by saying that the best advertisement is merit. This is undoubtedly true; but, as the American says, it is mighty slow in its action. If the inventors of sewing machines and typewriters had depended on merit alone for letting the world know the results of their genius, they would not now be in the happy positions they occupy. Of course, we fully recognize the fact that advertising does not merely consist in issuing leaflets and displaying posters. Everything we do in connection with our business is an advertisement, either good or bad. Prompt attention and courtesy on the one hand, or carelessness and incivility on the other; well executed orders and satisfied customers, or badly done work; reliable and intelligent statements as to capabilities of appliances, or bad advice and still worse fitting. It all comes back to us for good or for ill, and with what "measure we meet it shall be measured to us again."

Merit is unquestionably the foundation on which good business must be built, but only "push" will raise the edifice, while "publicity" will make an extension of premises necessary. The more convenient "sit still" policy certainly saves money for a time; but it is, in shopkeeping circles, generally followed by a "giving up business" sale. It may sound a paradox, but if we stand still, we are really going back. What is wanted in the gas profession is enthusiasm. There is no more "catching" virtue; and the public always like to deal with men who believe in their own medicine. "Like master, like man;" and if the leaders in the industry do not enthuse, there is little likelihood of the rank-and-file doing the little extra bit that means so much on the road to success.

### Practical Suggestions—Showrooms.

And now allow me briefly to enumerate one or two practical points, which, in my opinion, are indispensable in dealing with this subject. As might naturally be expected, I would place well equipped and up-to-date showrooms well in the forefrout, as a most important adjunct to the publicity side of gas business. I have no doubt the majority of my hearers agree with me as regards large places like Glasgow; but some may think that with small undertakings, the necessity is not so urgent. This is surely a grave mistake. It is a small place, indeed, that has no person who requires converting to the advantages of gas appliances for lighting, heating, or cooking; and any gas company, no matter how small, would certainly find a well-stocked showroom, where gas users could get reliable and unbiased information regarding all kinds of appliances, a most valuable asset. That this is not merely a pretty theory, is proved by the fact that in several small places within the speaker's personal knowledge, excellent showrooms are installed which more than justify their existence.

It is desirable that such showrooms should be in a prominent place, where the public can have no excuse for not seeing them. They should be not merely shops where gas consumers can get what they want, but attractive educative centres, where people with erroneous ideas about the uses of gas may have what is always the most effective righter of wrong notions—practical demonstrations of convenience and efficiency. To this end, it is well to have some special feature as a "draw." In our principal showrooms in Glasgow, we have a permanent exhibition of completely furnished rooms equipped with gas appliances. We have also gas-fires, water-heaters, &c., in actual operation. These have aroused keen interest among many who had hitherto little idea of what gas could really do. We have also cookery demonstrations at certain stated times, which have proved not only a means of instruction to consumers who have cookers, but have helped to arouse interest in other types of gas apparatus less well known. It is desirable that, as far as possible, orders, complaints, and accounts should be dealt with in the showrooms, as customers calling about these matters can see, and be interested in, appliances of which they would otherwise have no knowledge.

If the work of providing apparatus which will give consumers the best and most economical results for the gas used, is left to private traders, it may be said at once that it will be very inadequately done. This is not intended as a reflection on traders, but is simply a plain statement of fact, as can easily be proved. If traders anywhere could give a satisfactory display of gas apparatus, and keep up-to-date stocks of the latest pattern gas-fires, water-heaters, &c., surely they would be found in industrial Glasgow, with its wealth of business talent, and splendid array of wholesale and retail trade houses provided for the supply of almost every commercial commodity. But the fact remains that there is no warehouse in our city which carries a stock of gas appliances at all comparable with the Gas Department show-rooms; and if consumers depended on private enterprise for advice or guidance as to gas apparatus, I fear it would be mainly given through the medium of catalogues. Traders, of course, at once admit that they could not possibly carry stocks like us. Indeed, they even resent the mere suggestion that they should be expected to do so, on account of the capital involved; and so, of course, our customers would inevitably suffer. If it were furniture or millinery, the public would be admirably catered for. But where gas appliances are concerned, traders do not seem to think it worth while to take even the usual business risks. So if gas authorities do not provide the necessary facilities, they are really penalizing their consumers, and at the same time neglecting a profitable source of revenue.

### Literature and Press Notices.

The free distribution of literature is another important part of publicity, and will doubtless form one of the principal sections of the Institution scheme. The small or moderate sized gas undertakings cannot afford to neglect this matter; and there is no excuse for so doing, as a good selection of clever advertising leaflets is now available. One of the most effective ways of reaching gas consumers is, of course, through the medium of the gas accounts. These are usually sent out quarterly or three times a year; and pamphlets calling attention to the appliances then suitable for the season should be attached—cooking or water-heating in summer, or fires, radiators, &c., in the colder months. Direct advertising in the public prints is a costly business. But it should not be forgotten that editors are after all men of like purses as ourselves; and if gas pays good bills in the advertisement columns, they will see that it is fairly treated in the other parts of the paper. This is a most essential point, as after all, a well-written article is an excellent medium for reaching and influencing an intelligent public. An editorial or a friendly reference in a paper like the "Glasgow Herald," a paragraph in one of the popular monthlies, or a clever cartoon, exerts more influence than is dreamt of in some gas manager's philosophy.

Managers who are alive to their opportunities will also make the most of such movements as the Smoke Abatement crusade. After all, gas is the most practical solution of this problem; but the fact wants to be more strongly emphasized, not only in the Press, but by exhibitions.

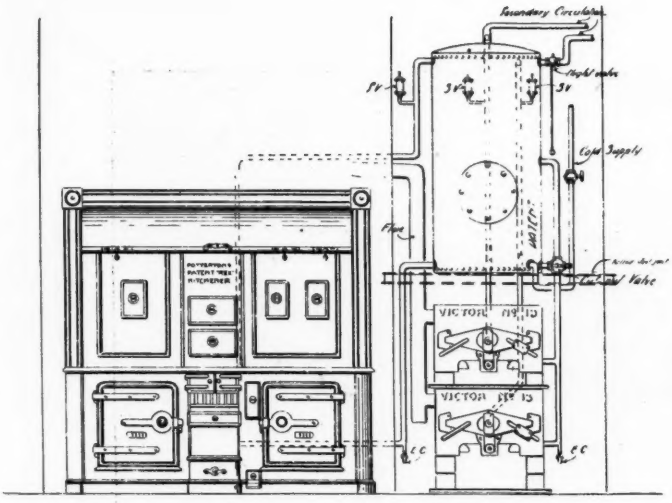
### Exhibitions, &c.

Surely the members of the North British Association do not require to be told of the benefits to be derived from exhibitions. Those who visited the Glasgow Smoke Abatement effort in this line had nothing but praise and congratulations for the display gas made; and, apart from the number of orders for appliances actually booked, the educative influence there exerted was very great. One important aspect of this influence was the marked change of opinion which resulted as to the advantages and the hygienic qualities of gaseous fuel; and this is, of course, a permanent gain, from which greater results will inevitably follow.

What better illustration of the advantages of combined effort in effective advertising could we have than this exhibition. It was, of course, largely a combination on the manufacturers' part with the active assistance of the Corporation; but the result was a fine testimony to the principle that "union is strength." It has been repeatedly stated in public (and the statement generally seemed to meet with unanimous approval), that there was not a gas-works from Stranraer to Inverness but had profited by that

# HOT WATER SUPPLY.

## POTTERTON'S PATENT VICTOR GAS BOILERS.



Sample of an Installation suitable for a Large Residence, Hotel, or Restaurant.

This form of apparatus was adopted some five years ago at a house in Lancaster Gate, Regent's Park, by W. A. WONNACOT, ESQ., Architect, since when several other houses on the same estate have been similarly fitted.

**THOMAS POTTERTON**

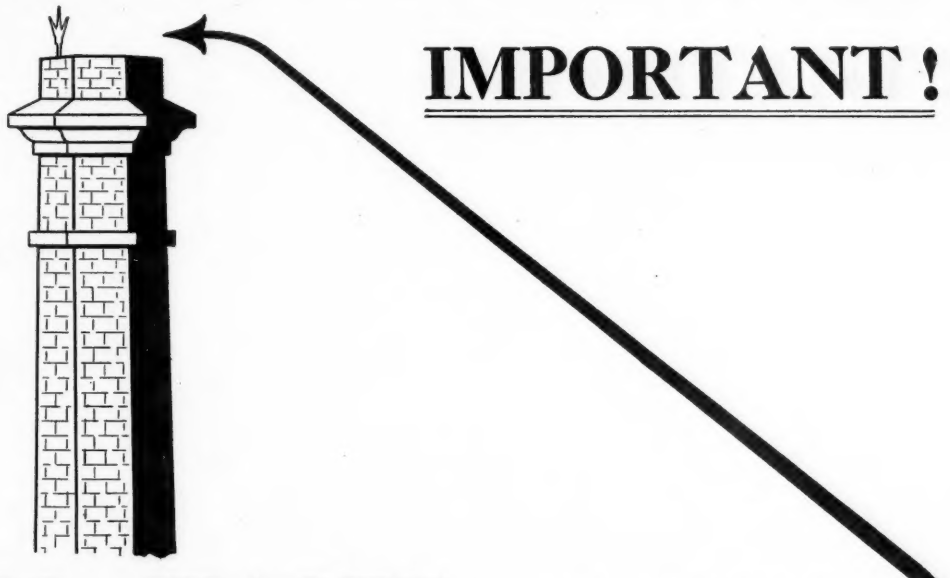
*Heating Engineer,*

**CAVENDISH WORKS,**

**BALHAM, S.W.,**

**LONDON.**

*CATALOGUE UPON APPLICATION.*



# IMPORTANT!

## NO WASTE UP THERE

WITH

**BROOKE'S PATENT REGENERATORS.**

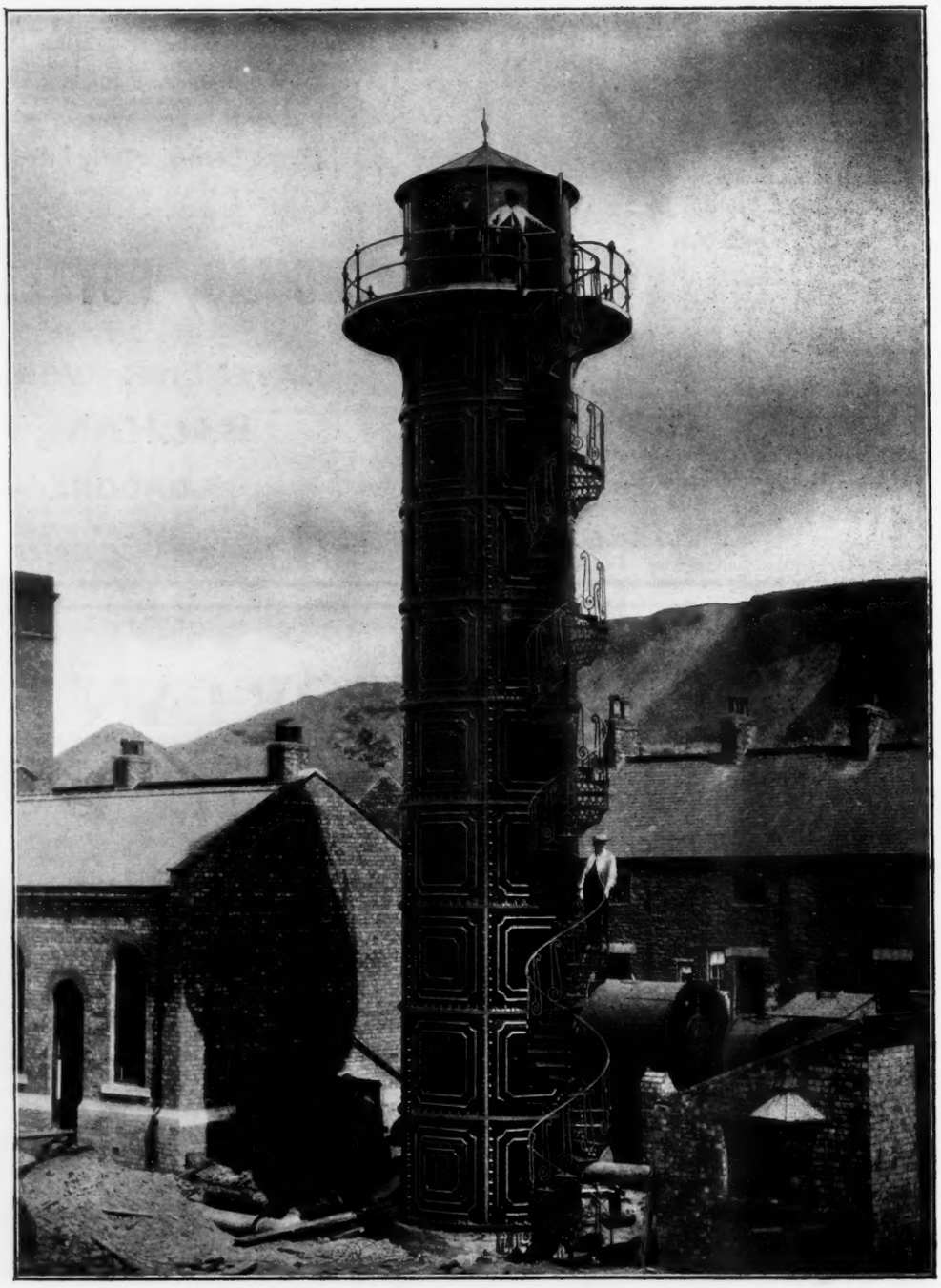
SOLE AGENTS: **ROBERT DEMPSTER & SONS, LTD.,**

**ELLAND.**

ILLUSTRATIONS & DESCRIPTIVE SPECIFICATION WILL BE SENT ON APPLICATION.

# THE WHESSOE FOUNDRY CO., LTD.

**WORKS: DARLINGTON.**



*CAST IRON TOWER SCRUBBER 9 feet Diameter by 45 feet High.*

*Made and Erected for The Spennymoor Gas Company.*

**LONDON OFFICE: 106, CANNON STREET, E.C.**

splendid effort. But cynics suggest that, while the majority of gas authorities seem only too pleased to profit by whatever benefits may be going, they are not quite as willing to bear their share of the financial burden.

Another much smaller movement might be referred to, as illustrating the importance of fostering everything that will tend to help the consumption of gas. I refer to paper bag cookery. Some superior gas engineers would doubtless sneer at the very idea that they should be asked to condescend to such matters; but the sneer would only show a false attitude of mind towards the whole aims and objects of publicity. Nothing should be too insignificant if it helps to foster the demand for gas; and nowadays dividends are got from apparent trifles.

I will only refer, in closing, to the growing favour with which such methods as the giving of free cookers, fires, &c., are being viewed. Managers are awakening to the fact that this form of losing a "sprat" in the form of hires, to gain a "mackerel" in the shape of increased make, is good business. It is only another form of publicity, which is certain to be greatly extended in the future.

The employment of lady lecturers, to visit and advise customers regarding the proper use of their appliances, is another practical form of advertising, which cannot fail to bring a good return; and I need only mention industrial appliances to at once touch the imagination of gas managers, and remind them of the enormous field lying undeveloped, and waiting ready for the hand of the diligent gas man. Gas has been applied to a thousand useful arts and crafts, and manufacturers will not be very long in adopting systems either of lighting or heating if economies can be proved; and this, to a man who knows his business, should be only a matter of detail.

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## A REPLY BY MR. J. NAPIER MYERS (OF SALTCOATS) TO THE PAPER ON PUBLICITY, BY MR. MASON.

Our President was keen about having my name upon this our Jubilee programme, as my father's was on the first, and suggested to me that I might be associated with Mr. Mason in the discussion about what is known among us as "The Publicity Scheme."

In a weak moment, I consented to appear as "Devil's Advocate"—*i.e.*, to reply to Mr. Mason, and to say what I could say for the old order that is passing away. It was weak on my part to accept such a brief; for I cannot manage in debate. My charity admits so much good presented by the other side. Then I am not logical, and am apt to blow both hot and cold, and to indulge in the feminine quality of denouncing things not in the paper.

I have had the privilege and pleasure of an early perusal of Mr. Mason's paper, and find I am in agreement with much he recommends. But the spirit at the back of the whole project is distasteful to me. My natural conservatism, the circumscribed sphere of my labours, and the innocence of any other opposition to the use of coal gas than the oil-lamp and the candle, puts me at issue with the spirit of modernity that pervades the paper. I do not like the "hustler," and his bouncing advertisement. He takes me for a very simple blade, who will buy his meal or marbles because he brags of them. I do not like log-rolling and speaking disparagingly of my neighbour.

This policy of "Devil-tak-the-hinmost" is pagan and not Christian; and I have yet to learn that what is not commendable in private life can be good public policy. I have been accustomed to think that the town's gas supply stands no more in need of blazoned advertisement than one's water supply or tramways. This does not mean that gas officials should carry themselves like emperors. They should remember that they are public servants, and be always on the alert to give the public honest service. If we continue to be of real public utility in our own parish, we will thrive; but if we think to continue our existence by means of the five-foot hat advertisement, we shall have to move on, in spite of all the money we may waste in advertising.

It used to be claimed by the early co-operators that they secured profits by saving shop-front and other advertising expenses; and by this means secured their bread and meat at bed-rock prices. I wish to see our gas sold on such terms, and not have to bear the cost of advertisements (as if we were exporters), the cost of the "ironmongery-for-nothing" department, and the waste this policy entails.

We are all with Sir William Ramsay, when he said last week: "We all live in hope that the world will grow better as the years roll on."

One of the most important methods for the physical betterment of the city man's world is the use of gaseous fuel, and the supression of the practice of burning green coal. I have a good deal of sympathy with the public opinion said to prevail in New England cities, that one may be pardoned for shooting his neighbour, but not for firing his own barn.

In order to accomplish this kind of betterment, I know there is great need for all Mr. Mason's effort to "educate, educate, educate!" I approve Mr. Mason's exhibitions, demonstrations, and lectures; but I deprecate the music and the dancing, the bribery and corruption, by which it is sought to inveigle people to buy what they do not want, and to spend money to no profit. The vicious part of Mr. Mason's paper is in the tail, where he alludes to the giving of free cookers and gas-fires.

He characterizes this as being ground bait—"sprats" to catch "mackerel." This policy of giving away ironmongery for nothing is vicious and ephemeral, like the furnishing of houses by the consumption of tea.

It is the policy of gas conveners who hope to become popular, aided and abetted by ambitious gas managers. This is the policy that will bring about the state of things Mr. Mason deplores, where he states that private traders may be depended upon to cater for millinery and furniture, "but they resent the mere suggestion that they should carry large stocks of gas appliances."

Here I think we have cause and effect. It is the cheap sales department of the corporation that puts out the private trader. My own experience in the ironmongery business is perhaps too trivial to mention. During four or five years the Saltcoats Gas Company engaged in the hiring of gas-cooking appliances (acknowledging the need there was to teach the public to use gas for other purposes than for lighting); and during these years the local traders declined the business. When my Company abandoned the practice of hiring (owing to the waste entailed at the flitting season, through the migratory character of our population), traders began again to stock the appliances suitable to the picnicking habits of our people; and I think the private traders do this business at less cost to our town than if done by the Gas Company—that is, the direct charge to those who buy the appliances is less than if the charge was merged in the indirect taxation—if the rate for gas bore the cost of the gas appliances.

I am disposed to charge you city men with a conspiracy of silence, in regard to this gas-stove business. You never tell us here about the drawbacks of the hiring business that we hear of in private—about cookers being in families where they never indulge in baked meats, of gas-stoves being used as cupboards for saucepans, or stores for fire-lighting, and become merely stands for hot plates.

A hired thing, whether a cooker or a cab-horse, is often a neglected thing; and you ever-zealous men who are doing your best to spread these appliances broadcast (with the view to increase your sales of gas) are destroying the spirit of carefulness in our Scottish people.

I have a good deal of sympathy with the collectivist's ideals; but this cooking in the municipal box, soon to be followed by sterilizing the municipal milk in the municipal saucepan, is Socialism gone mad.

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The PRESIDENT said they had had two very able contributions on this subject; and the matter was now open for discussion.

Mr. A. YUILL (Dundee) said this innovation at their fiftieth anniversary meeting would form a feature at their subsequent meetings. He did not stand as an advocate of Mr. Mason; but the lines he had put forth were worthy of consideration, because if they took the case of a company and asked what had been the origin of that company, whether it had been a philanthropic desire to supply the people in the district with gas, or whether it had been with a view to trying to make profit, they would all admit that the inception of any company was with a view to making profits, not altogether with the view of selling gas. If this were the view, those who had experienced the two sides of the question would admit that the more they advertised, the more they brought their wares before the general public, the larger the success they would meet with, and, consequently, the greater would be their profits. He was in entire sympathy with the Publicity Committee; but a difficulty arose with some of them when they appealed to their corporations. Some would be quite willing to subscribe, but an auditor stepped in and said he would not allow them to pass the account. In his case, the Town Council were the managers of both the gas and electricity departments, and they felt that they would be advertising the one department against the interests of the other, and that this would not be fair. Therefore they declined to allow advertising inside the town, and they would not spend any money to go outside. He could agree with Mr. Mason when he spoke of giving free cookers and free fires, and fixing free. They had given free cookers in Dundee since the year 1905. He did not wish to particularize as to the extra profits which they had got—suffice it to mention that they gave free cookers. The price then charged was 2s. 10d. per 1000 cubic feet; it was now 2s. 2d.—a reduction of 8d. since they introduced free cookers. Bearing these facts in mind, his Council were thoroughly impressed with the wisdom of the step they took. This year they had gone one further, and had agreed to give free fires. Another step he had taken was the appointment of lady demonstrators, who went about and educated the people in the proper uses of cooking-stoves. He found—and no doubt several of them would have experienced the same thing—that a person might get a cooking-stove installed, but was not thoroughly conversant with the working of it. He might be able to light the gas, but when he began to cook, he could not do it. So they had appointed lady demonstrators to teach consumers. What they were doing in this way was on the lines of publicity. They felt they were doing it for the benefit of the community. They were doing this work at home, and it was quite within their province; but to pay 2s. 6d. per million of their annual make was a thing which their auditors would not admit nor acknowledge. Mr. Myers deprecated gas-works fighting against each other, and said that tramways and water concerns did not do this. He must remember, however, that if there were two water companies or two tramway companies in a town, they would fight.

Mr. ALEX. WILSON (Glasgow) was afraid he was not on Mr. Myers' side. He must congratulate him on the way he managed his part; but, at the same time, he could not congratulate him on the matter. He was afraid he must take the side Mr. Yuill had

taken. Most of them would find Mr. Mason was on the right lines, and the sooner they got to understand this, the better it would be for all of them. He remembered that his old friend, Mr. M'Gilchrist, used to say: "It is not gas we want to sell; it is light." It was not gas they wanted to sell nowadays; it was service to the community. The real thing they had to get at was how best to serve their customers. Were they going to give them cheap gas, and nothing to use it with, or give them every facility for getting appliances, and so enable themselves to give a much better service? He was rather surprised to hear Mr. Yuill make a remark he did about the auditors. So far as Glasgow was concerned, they had not had any trouble with them; and he had no doubt that Glasgow would come into line in regard to the publicity proposals. The work would be much better done in co-operative fashion than it would be by any company or corporation singly. If the Publicity Committee were helped in the way they should be helped, he had no doubt they would show a good return for the money which was given them by subscribers. In the matter of supplying free fires—which, of course, was a question for each separate district—they would all have to settle for themselves how far they could go. He was glad to say he thought Glasgow was coming into line in the matter of free cookers. It was not yet arranged; but before the year was out, he hoped to see free cookers in Glasgow. This would be a great thing. It would mean a lot of work for the Department; but it would be work worth doing, and worth the large expenditure incurred, and on which, he was sure, there would be a good return. In all places the payment would be in proportion to the output. Mr. Myers, it was to be hoped, would fall into line, like the rest of them.

Mr. W. Ewing (Lochgelly), as one of the pioneers in relation to the idea, said the day would surely come when they must supply free cookers and burners, and let the consumer maintain them. He advocated this many years ago, when at Hamilton; and he thought both the Editor of the "Journal of Gas Lighting" and the Editor of the "Gas World" were rather severe on him at that time for making such a proposal; but they latterly admitted, when free burners and maintenance were given, that the day had dawned for a few improvements in gas supply. He had no doubt there were many places where they were not able to give free cookers and fires, because of over-capitalization; but the tendency of the times, as had been forcibly shown, was in the direction of doing the best for their consumers.

Mr. Mason said both Mr. Myers and Mr. Yuill referred to two departments fighting one another. He thought this would be a good thing. It would be a pity if two departments in one corporation should lie down to one another. Opposition in business was the life of trade. If it were the case that in the gas department they should say that electricity could do this, and they would not bother about it, it would not do. It was better that they should do the best they could for themselves. As to the matter of free cookers and free fires, it was not so very easy, in a place like Glasgow, to do it, because it involved such a large outlay. He understood Mr. Myers had at present no opposition except from the paraffin lamp and the candle, but there was a possibility that there would be opposition from an electric source. He would ask Mr. Myers to give a paper next year, after the electric people had arrived.

Mr. Myers thought he had better let go what he had said, without enlarging on it. The day was too short, and too far gone, for him to "let himself go" any farther. But he would ask them, in thinking about this matter, not to stand under the hill, as it were, of business, but to lift themselves above it. One's imagination palled at the thought of a municipality undertaking and offering so much service to the community as was involved in the supplying of cookers and fires free. It was the tendency that he opposed, rather than the particular items of Mr. Mason's programme. He was sorry to think there was anybody who would stand up for his way of looking at things; so he (Mr. Myers) stood as Athanasian before them, and before the whole world.

Mr. R. G. Shadbolt, at the request of the President, then addressed the meeting. He assured them that no one present had enjoyed the debate more than he had. It was opened in an exceptionally able manner; and it was replied to in the very best of spirit. "Socialism gone mad" had been spoken of. Well, if Socialism never went madder, then they were safe still. Mr. Mason gave them a Scotchman's motto, in that particular, which he thought was very *apropos* at this particular stage—"Cast your bread upon the waters when the tide is coming in." The tide was coming in; and now was the time to cast their bread upon the waters. The Council of the Institution of Gas Engineers were appealing to members to gather round them in greater numbers than they had done hitherto, and so make an effort which would meet with the greatest possible success. His presence there that day was due to the Publicity scheme possibly as much as to anything else; and he should like—and he should think there were many members present who would like—to see the scheme much better represented among those who had undertaken to support it than it was at present. The publicity scheme was practically launched. The question now was not whether or no they should push their wares. They were agreed that the time had come when they ought to enlighten the public. The point now was, having put their hand to the plough, not to turn back, even under the persuasive powers of Mr. Myers. Mr. Yuill had raised a legal question. It did seem that there was some bogey in this. One point which could not be too often driven home was the fact that they not only wanted money, but they wanted all gas undertakings represented. It was news to him that this idea originated with Mr. Ewing. It was so long ago, possibly, that they had all lost sight of it. But the idea at present originated among the Commercial Sections. Was the scheme likely to pay? It would not be out of place if they were to glance at what their rivals were doing. The electricity people said their Committee had been in operation for over a year, and that the result of the first year's working had been in every way satisfactory. If this were so in regard to the publicity method of their friend and rival, the electrical industry, how much more must it be in the case where they had so much better a commodity to place before the public? Let them move in a body—let them move solidly; and when they did take up this great work, let it be done thoroughly and well. What was the response from Scotland? The list made up the other day showed, he thought, only twelve undertakings willing to give support—and there were, he thought, about 260 gas undertakings. The smallest undertaking would derive some benefit from the publicity scheme. All would benefit; then why should not all assist? The amount asked for was ridiculously small; then why hesitate? The members of the Association had it in their power to influence very greatly the men under whom they worked; and he said it was their bounden duty to do their utmost, between now and October, when the meeting would be held which would form the publicity scheme, to induce the undertakings with which they were connected to throw in their lot with it. The amount asked for was so ridiculously small that one wondered why there should be any hesitation. The thing was there; so let them, with "a long pull, and a strong pull, and a pull together," show the world that they had a very great deal of useful service at their command, and let them remember that by increasing their output they were increasing their profits, and benefiting the community at large.

Mr. Yuill said that Mr. Shadbolt, as President of the Institution of Gas Engineers, might take up the matter which had been mentioned. The Institution might see if there was any way out of the difficulty which they were in.

Mr. W. B. M'Lusky (Perth) pointed out that insidious and absurd articles in favour of cooking by electricity were published in influential papers; and he asked how these were to be met.

Mr. S. Milne (Aberdeen) pointed out that the Corporation of Dundee contributed to the Young Memorial Fund, and that no question as to legality was raised on that occasion.

Mr. Yuill replied that that was a case of furthering the interests of the department. When the subject was before his Committee, the question of legality never entered into the matter at all, but rather the fact that they were representatives of the electricity as well as the gas department; and they did not approve of advertising one of them.

Mr. Alex. Wilson said that this was also discussed at their Committee meeting; but it was felt to be not a question of destroying one of the undertakings—it was a question of putting the advantages of gas as clearly as possible before their consumers and the public. It was stated that they were there to further the interests of gas; and he thought this was the better way to follow the thing up. As to the difficulty of subscribing to the one thing and not to the other, he failed to see how the line could be drawn. If the Dundee gas undertaking were allowed to advertise in local newspapers, and to issue leaflets, he failed to see how they could not go a little further and spend some money on the Publicity Committee, so as to extend the advertising.

The President said he had endeavoured to obtain the consent of his Town Council in this matter more than once; and the ruling of the Town Clerk, which was taken as binding, was that they had no funds for such a purpose. He knew that in Scotland there were a great many corporations similarly situated. In Scotland, gas undertakings were comparatively small, and corporations did not look upon the matter in the same way as they did. Perhaps it was because they were asked to contribute 2s. 6d. per million cubic feet of gas that there was objection. If it were put in some other form (such as the purchasing of literature), they might get over it; but as long as it was a request to contribute so much, he believed that in many instances it never would be done. He said in his address that he thought the opinion of the Scottish Office should be taken as to the legality of using money in advertising.

Mr. W. Blair said he had had the opportunity of laying the circular before his Committee; and he thought that the spending of money for the benefit of the department should be at the discretion of the department. They ought to try to push this point, and have a ruling from the Secretary for Scotland upon it.

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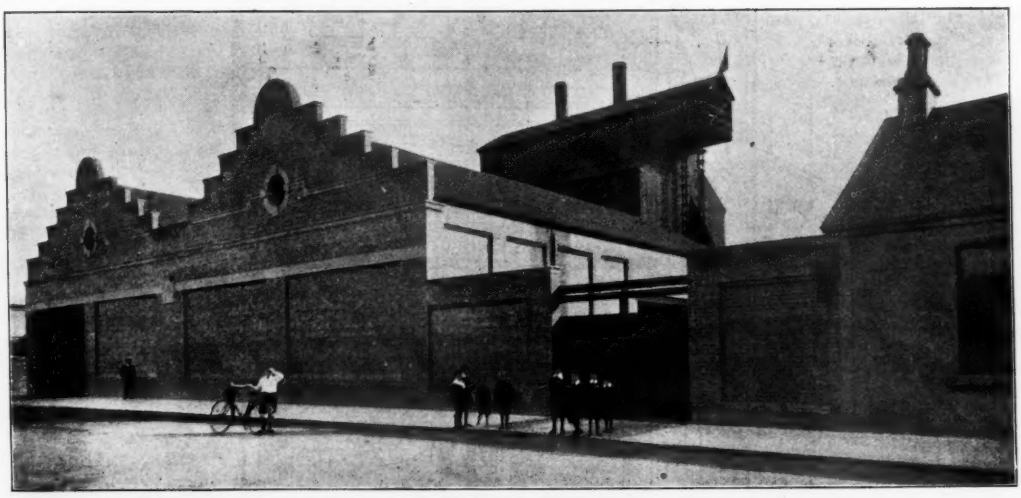
**Measurement of Water Flowing in Small Pipes.**—A device designed to measure the quantity of water flowing in pipes where conditions exist which make the use of meters undesirable, consists of a simple mercury U-tube so connected as to show the drop in pressure between two points in the pipe. These two points are not to be less than 25 feet apart, according to a description of the apparatus given in "Power," and at each of them a small aperture—say ⅛-inch diameter—is made in the pipe and threaded. These apertures are connected by a line of ⅛-inch piping in which a U-tube half filled with mercury is inserted at some convenient point. When water is flowing in the main-pipe, there will be a drop in pressure between the two points, causing the mercury to be elevated in one leg of the U and depressed in the other. The pressure drop varies with the velocity of flow; and by calibrating the device the volume of water passing may be determined.

# THE INSTALLATION OF GLOVER-WEST VERTICAL RETORTS AND THE EXTENSIONS AT THE HELENSBURGH CORPORATION GAS-WORKS.

By W. Blair.

[A Paper read before the North British Gas Association of Gas Managers, Sept. 7.]



The Helensburgh Gas-Works, showing the Position of the Vertical Retorts.

The renewal of the carbonizing plant and the provision for the increasing output of gas at the Helensburgh Corporation Gas-Works having been found necessary, the Gas Committee acquired an adjoining plot of land, measuring 126 feet by 136 feet, for the purpose of erecting new coal-stores and carbonizing plant which would permit of a railway siding into the gas-works from the adjacent goods yard.

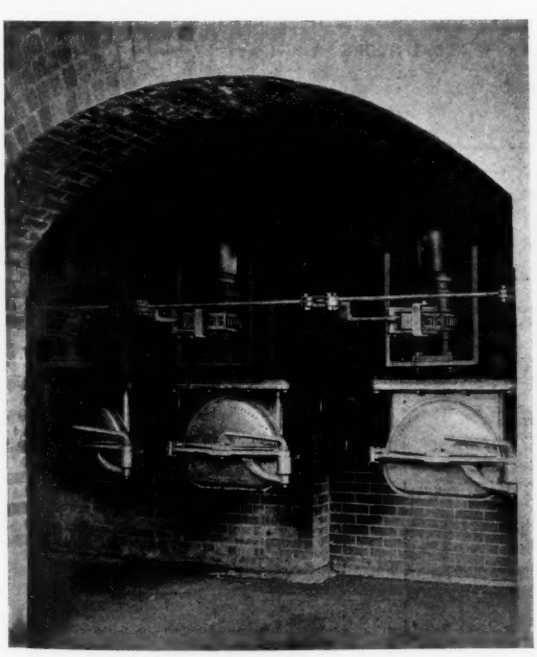
## The Glover-West Retort Installation.

With the object of installing the most suitable form of carbonizing plant with labour-saving machinery of the required capacity, the author made a study of the merits of the several modern methods of carbonizing in horizontal retorts with power stoking machinery, and concluded that, with an annual make of gas at Helensburgh of about 60 millions, it could not be economically introduced to produce results which would warrant the entire reconstruction of the existing plant.

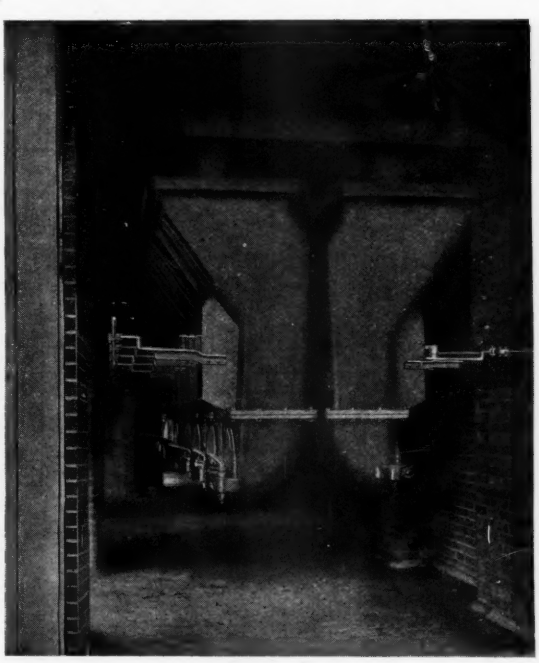
The merits of the system of carbonization in inclined retorts were also considered; but when comparing the working costs and results of both the inclined and horizontal retort systems with those of either the intermittently or continuously operated vertical retorts, which have during recent years made such advance in the progress of the science of gas manufacture, the comparisons on all points were found to be entirely in favour of the continuous system of carbonization in vertical retorts. In consequence, this latter system was eventually chosen for the extensions of the gas plant at Helensburgh.

During the course of the inspection of the several carbonizing plants where vertical retorts were installed, the author had the privilege of inspecting the Glover-West vertical retort installation on the continuous system in operation at the St. Helens Corporation Gas-Works. It was ultimately realized that, owing to the ease with which the plant was operated, the absence of smoke and steam and other advantages, this system would be the best to be recommended for adoption at Helensburgh—assuming, of course, that the cost of the installation would not be excessive when taking all advantages into consideration.

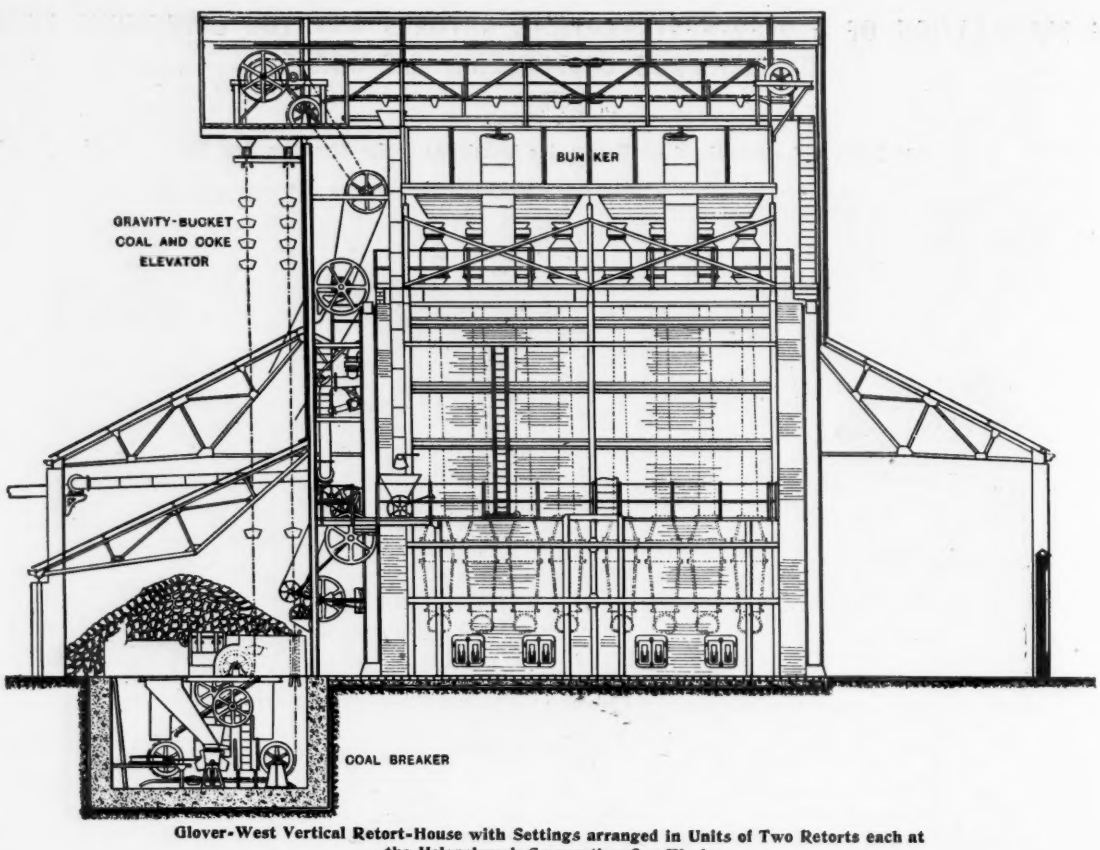
West's Gas Improvement Company, Limited, the constructors of the Glover-West vertical retort plant, were invited to submit a scheme and tender for an installation to occupy the new site on the works, and to conform to the requirements of the minimum and maximum daily make and the maximum annual make of gas, with provision for an increased output. The scheme and tender having been submitted, a careful comparison was made between it and the cost of installing other systems. The comparison being in favour of the Glover-West system, and the constructors



Coke Extractors and Chambers of the Glover-West Vertical Retorts.



Coke Chambers of the Glover-West Vertical Retorts at Helensburgh.

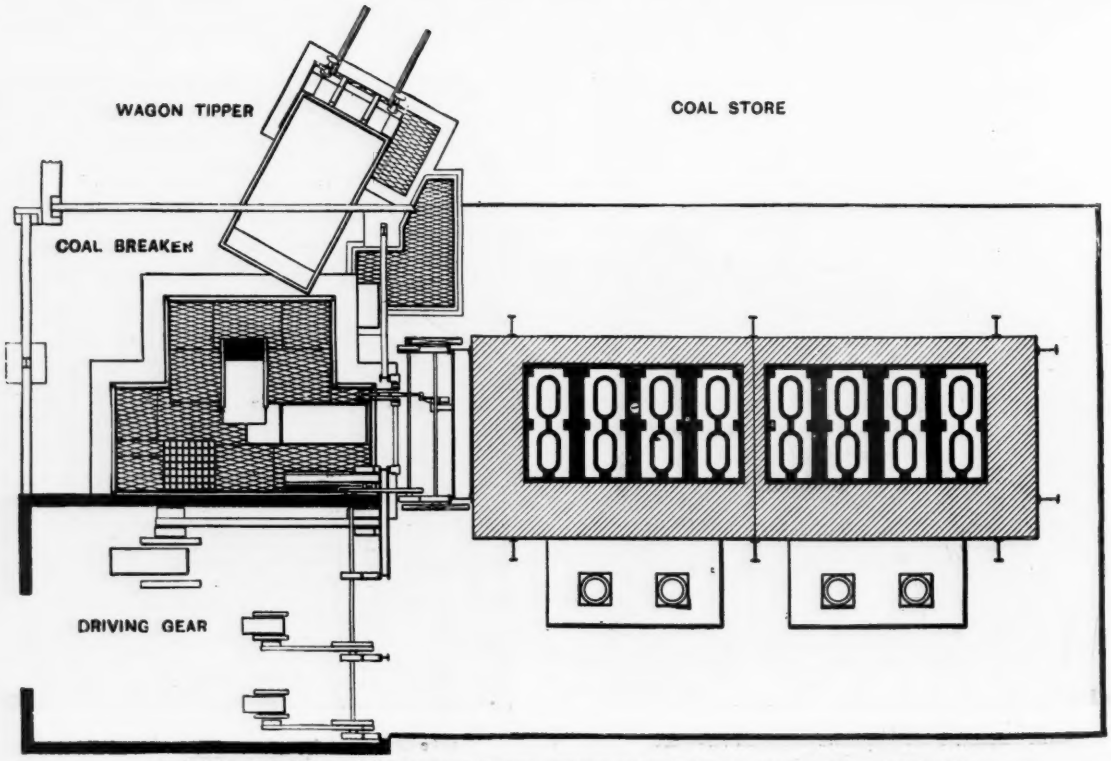



**Glover-West Vertical Retort-House with Settings arranged in Units of Two Retorts each at the Helensburgh Corporation Gas-Works.**

of the plant being prepared to enter into a guarantee as to its efficiency, it was arranged to test a sample of the coal used at Helensburgh in the St. Helens plant, in order to verify the statement that the local coals could be satisfactorily carbonized in vertical retorts.

The results from the tests with 56 tons of coal sent to St. Helens were so satisfactory that the author had no hesitation in recommending the Gas Committee to adopt the Glover-West system, and in doing so to accept the tests made at St. Helens as a basis of the calculations for the guarantees to be embodied in a contract for the installing of the plant.

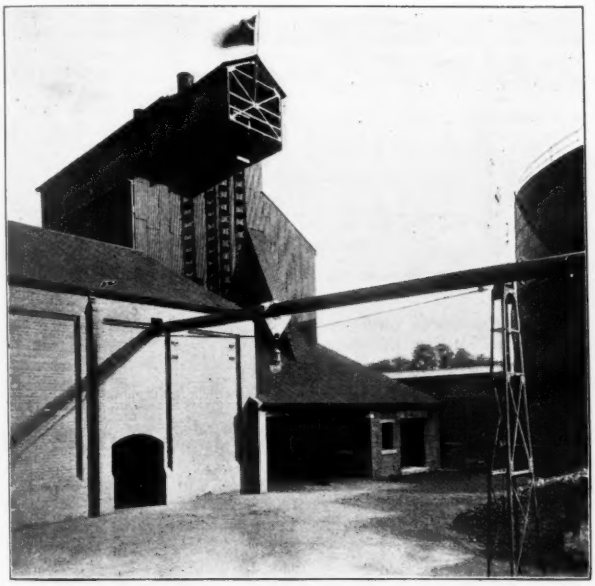
Previous to the test referred to above, the Chairman and the Works Committee visited the St. Helens works, and were highly pleased with all they saw. On their return to Helensburgh, they, in their report to the Council (dated July 21 last year) recommended the placing of a contract with West's Gas Improvement Company, Limited, for the construction of the work comprising coal-stores, retort-house, and an installation of Glover-West vertical retorts of a total approximate capacity of 500,000 cubic feet per day, and which, together with railway waggon tipper, railway siding, weighing machine, and the purchase of the land forming the site for the extension, in all made a total estimated cost of £14,711. To this sum a small amount was added to cover the cost of apparatus considered necessary to make the plant complete.




**Plan of the Installation of Glover-West Vertical Retorts at the Helensburgh Corporation Gas-Works.**

The report of the Gas Committee to the Council contains a long list of the advantages that they observed with the Glover-West system during their inspection of the plant at St. Helens; and the following is a copy of these advantages as given in their report:

Increased make of gas per ton of coal carbonized.
Charging by gravitation.
Minimum mechanical operations.
Low fuel consumption.
Conservation of heat.
Waste heat of coke utilized for heating secondary air.
Coke improved and of greater value.
Cool condition of coke when discharged.
High calorific value of gas.
Low percentage of inert gases.
Increased yield of tar per ton of coal carbonized.
Increased make of gas per retort.
Increased production of ammonia per ton of coal carbonized.
Largely increased make of gas on same ground space.
Improved labour conditions and at considerably reduced cost.
Great economy and saving in first cost of land and buildings.
Reduced wear and tear on retorts.
No naphthalene difficulties.
No nuisance from dust, flame, steam, or smoke.
Noiseless in action.



**The Gable End of the Vertical Retort-House.**

The coal sent to and tested in the St. Helens plant produced on an average during the test 11,625 cubic feet of gas per ton of coal of an illuminating power of 16·11 candles with the No. 2 "Metropolitan" burner, the calorific value being 576·9 B.Th.U. gross or 513·8 B.Th.U. net. This test, as already stated, formed the basis of the guarantees included in the contract. It will, however, be seen, by comparison with the tests made on the plant at Helensburgh, that with the same class of coal (Woodilea nuts) the results were better than those at St. Helens, and the guarantees are in consequence amply fulfilled.

The plant was completed and put into operation on July 4, and within eighteen hours, the horizontal retort-house was shut down completely and has remained so since—the whole of the gas being made in the Glover-West vertical retorts.

The following are the results of tests made on the plant at Helensburgh on Woodilea washed nuts—

| | |
|---|---|
| Duration of test | Aug. 25 to 27, 1911. |
| Coal carbonized per retort in 24 hours | 3·06 tons. |
| Gas made per ton of coal (N.T.P.) | 12,605 cubic feet. |
| Illuminating power (No. 2 "Metropolitan" burner) | 16·3 candles. |
| Fuel account | 11·68 per cent. |

Comparing the foregoing results with those obtained at St. Helens, and which formed the basis of the guarantees in the contract, the coal carbonized per retort per 24 hours shows an increase of 5 cwt., and the quantity of gas obtained from the coal is almost 1000 cubic feet per ton more than the guarantee.

It is estimated that the introduction of the new plant will effect a saving per annum of £1100 to £1200, and the labour costs will be at the very least 50 per cent. lower than those with the old system of working. The author hopes to have the opportunity of submitting at a future meeting full details on this point and based on twelve months' actual working.

The author, in submitting the reason which induced the Gas Committee of Helensburgh to decide upon the introduction of vertical retorts, would have preferred that a longer period should have elapsed between the putting into operation of the plant and the reading of this paper, in order that the results could have been given for a working experience extending over the greater part of a year. He has, however, every confidence in stating, from the average results already obtained, that the favourable anticipations which prompted their decision to instal the plant, will be more than realized. In support of this statement, it may be mentioned that the average make of gas per ton for all the coal carbonized from the date when the installation was put into operation to the present time works out at 12,345 cubic feet.

Apart from the carbonizing results, one of the questions which suggests itself to be of paramount importance is that of maintenance; and on this point, although it is impossible to arrive at a definite conclusion with so short a period of working, the absence of costly mechanism, the slow speed of the mechanical operations, and the almost ideal conditions under which the retorts work, suggest a long life.

### The Extensions of Plant at the Helensburgh Gas-Works.

The following is a description of the extensions, including the coal-handling and storing plant, with vertical retort-house and installation of Glover-West vertical retorts at the Helensburgh Gas-Works.

Arrangements were made with the North British Railway Company to enable the coal waggons to run direct from the railway siding into the coal-store. The railway track is extended across the coal-store to a point where a hydraulic waggon tipper lifts one end of the waggon and discharges the coal to the mouth of a coal breaker—thus facilitating the discharge of the coal to the plant. The waggons are weighed on a weighbridge situated inside the coal-store, and there is a turntable to enable them to be diverted to lines leading to other parts of the stores and works.

The retort-house is constructed of steel stanchions of modern design, with walls of 4½-inch brickwork built in between longitudinal girders and the main principals or stanchions, except on the coal-store side and the main gable end, which are covered in by galvanized corrugated iron sheeting.

There are two settings of retorts on the Glover-West system of continuous carbonization. Each setting contains eight retorts, making a total of sixteen retorts for the complete installation. The arrangement of the retorts in the settings enables any two retorts to be in operation, and, in consequence, the output of the installation can be readily regulated to meet the requirements ranging between the minimum and maximum make of gas. To provide for economy in working when the setting is on minimum make, each setting is constructed with a twin producer.

The coal is received from railway waggons by a West's coal breaker, for breaking the large pieces of coal to the size required. From the breaker the coal is directed to a gravity-bucket type of elevator and conveyor, which raises the coal and distributes it to a bunker of a capacity of 24 hours' supply, which is placed above the retort-bench and provided with a number of outlets corresponding to the number of retorts.

Each retort is independently supplied with coal from the overhead bunker through a gas-tight coal valve to a feeding hopper, from which the coal slowly and continuously falls by gravitation to the retort, and through it to a coke-receiving chamber. The coal on passing through the retort becomes completely carbonized; and the residual coke is extracted by means of a worm extractor at the base of each retort. The speed of the worm regulates the speed at which the coal is continuously passing through the retort. The coke accumulated in the coke-receiving chamber below the retort is periodically discharged to coke barrows and transported to the coke-store.

In connection with the Glover-West system of carbonization, the heating of the retorts is an important feature, and is specially applicable to continuous carbonization in vertical retorts. The combustion chambers are arranged in tiers, each tier being separate from the other. The products of combustion, after passing around the retorts, enter a common duct which is exterior to the combustion chambers; and the waste gases then circulate through chambers situated at the top ends of the retorts before entering the chimney.

Further, in the Glover-West system of heating vertical retorts, the secondary air supply for completing the combustion of the producer gas in the several separate combustion chambers circulates around the base of the retorts, extracting the heat transmitted from the coke to the walls of the bottom section of the retorts which at the base are constructed of cast iron.

The recovery of the heat from the coke in the Glover-West system ensures very considerable economy in fuel consumption. It also enables the coke to be discharged in such a cool state that no quenching is required.

The construction of the coke extractor is another important point in connection with the Glover-West system, as the worm is constructed in two parts, to enable one part to revolve away from the other and disclose an aperture sufficiently large to readily permit the use of scurfing tools and the inspection of the retort. This extractor gear is driven by a gas-engine and driving gear having a very considerable range of speed regulation, which enables the speed of the coal passing through the retorts to be regulated according to the class of coal being carbonized. The gas-engine, which is of 4½ B.H.P., is duplicated to provide for continuous working. A safety device is fitted to each set of coke extractor gear to prevent breakage in the event of overload.

The coal plant is driven by a gas-engine; and the gravity

bucket type of coal conveyor also serves the purpose of raising the coke to the top of the retort-bench when it is required to supply coke to the retorts on starting-up the plant and after the retorts are scurfed. This conveyor also raises the coke required for the producer—the coke being delivered to a hopper shoot arranged to supply the producer filling waggon.

The gas is taken off at the top of the retorts and passes, through pipes, to the condensing mains and thence to a foul main, which is provided with a retort-house governor. The foul main extends across the works, and is connected up to the foul main of the old horizontal retort-house plant.

It is peculiarly appropriate at this meeting to state that the Glover-West system of continuous carbonization is partly of Scottish origin on account of its early association with the late Mr. William Young, the well-known inventor of the successful continuous process of carbonization in vertical retorts as applied to the shale oil industry, and which has been in operation during many years in Scotland. Mr. William Young was co-patentee with Mr. Samuel Glover, the Gas Engineer to the St. Helens Corporation, in the first patent, the subsequent development of which is due to the co-operation between Mr. Samuel Glover and Mr. John West, the pioneer of modern methods in retort-house practice, and who has probably had a longer and more intimate experience of carbonizing plants than any other gas engineer at present living.

TESTS MADE AT THE HELENSBURGH GAS-WORKS WITH GLOVER-WEST'S VERTICAL RETORTS.

From 9 a.m., Aug. 28, to 12 noon, Aug. 31—

| | |
|---|---|
| Gas made | 491,500 cubic feet [n.t.p.] |
| Total coal carbonized | 37 tons 14 cwt. |
| Gas made per ton | 12,037 cubic feet. |
| Coal carbonized per retort per 24 hours | 3·02 tons. |
| Fuel consumed | 11·7 per cent. |

From 6 p.m., Sept. 2, till 6 p.m., Sept. 6 (a period of 96 hours) the gas made with four retorts was 740,800 cubic feet. The average quantity of gas made per retort per 24 hours was 46,300 cubic feet.

### Discussion.

Mr. A. YUILL (Dundee) said that some of them remembered the interest which was excited years ago when inclined retorts were put in; and while they had got the vertical retort before them now, they must not imagine it was going to "lick creation," because they knew that some of their contemporaries—if not in Scotland, at least in England—were getting remarkable results from a new adaptation of their horizontal retorts, with hydraulic charging machines, which were not possible before. Each of them would require to study his own works. He (Mr. Yuill) was one who could afford to wait a little longer. He had got over 30 per cent. of spare retorts in winter; and, getting good results, he was satisfied. His position was that for him to erect a bench of verticals just now, would add considerably to his capital expenditure when it was not required for carbonizing purposes. He believed that the extra interest and sinking fund charges would absorb the savings to be got from vertical retorts in his case, compared with the best system of working horizontal retorts.

Mr. D. ROBERTSON (Dunoon), as one who, the previous Saturday, saw Mr. Blair's installation of vertical retorts, said he would like to take this opportunity of saying that he was very much impressed by the fact that the installation was compact, and everything worked so smoothly. He could not help contrasting, when the retorts were being drawn, the ease of the operation, with the operation as at present conducted with horizontal retorts, in a small or medium-sized gas-works. The man simply went forward and pulled a lever, and there dropped out a big barrowful of comparatively cold coke. There was no quenching of the coke with water, and there was no steam. He failed to see why this system of charging retorts, or of gas making, could not be introduced into even smaller gas-works than those at Helensburgh. They knew that it was possible to work with two of the Glover-West retorts, as a minimum. Two retorts would, from Mr. Blair's figures, make from 76,000 to 80,000 cubic feet of gas during 24 hours. This came down to a small gas-works; and one man could do the work. He (Mr. Robertson) thought that a considerable saving could be effected in most gas-works which were in a position to adopt the vertical retort system. Another advantage, he thought, could be worked into this. It struck him, when he was watching the operation, that if anything went wrong with the coal-elevating plant, there would require to be some plan for elevating coal by hand; but he was thinking that if a gas-works were situated on the side of a hill, an installation might be placed so that the retorts could be charged by hand, which would be a distinct saving.

Mr. BLAIR thanked the members for the hearty reception they had given to the figures he had laid before them. If he had been in Mr. Yuill's position, of having 30 per cent. excess of horizontal retorts beside him, he would never have gone in for verticals. It was a question of policy with him. He cast his lot in favour of verticals; and he found that he would not be disappointed. He thanked Mr. Robertson for the remarks he had made. He might say that he had considered all the possibilities of a breakdown, even in the extracting gear; and arrangements had been made for a temporary service if needed. Everyone who went in for mechanism must make up his mind for a breakdown occasionally. He could see how the temporary work could be done; and the plant was already in the works for the doing of it.

## SUCTION GAS-ENGINES AND PRODUCERS AND THE DIESEL OIL-ENGINE.

In a paper which he submitted to the Engineering Section of the British Association at Portsmouth last week, Mr. W. A. TOOKEY furnished a comparison of test performances of suction gas engines and producers, with results obtained in daily operation, and notes upon working costs for fuel, oil, labour, &c. The contribution was a lengthy one, and embraced a number of tables and charts. Mr. C. DAY also communicated a paper on the Diesel oil-engine.

### SUCTION GAS-ENGINES AND PRODUCERS.

The following are portions of Mr. Tookey's paper.

It has so long been customary to state that the consumption of coal (anthracite) by suction gas engines and producers is about 1 lb. per brake horse-power per hour, that it is rarely borne in mind that such a statement is made by makers merely for the purpose of stipulating a safe figure in contract guarantees, well knowing that this leaves a margin for contingencies which enables them to comply with specified duties without the risk of incurring penalties which are sometimes insisted upon by purchasers or by consulting engineers on their behalf. It will come as a surprise to many, therefore, that in the majority of the tests the actual consumption of a combined set of engine and producer, working with anthracite, irrespective of size, but, naturally, dependent somewhat upon design and date of manufacture, is between 0·7 and 0·85 lb. per B.H.P. hour. When allowances are made for the

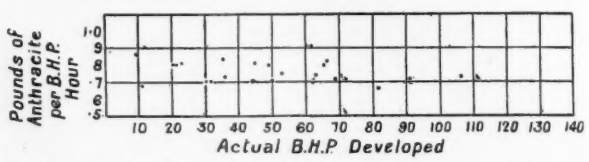



**Fig. 1.—Chart Showing the Fuel Consumption in B.H.P. Tests.**

different conditions under which the respective tests were conducted, the varying qualities of fuel, and the diversities in rate of fuel consumption in producers of different designs, the figures for the coal consumption on the B.H.P. hour basis are remarkably uniform for engines loaded more or less up to the full outputs for which they are severally capable. It cannot then be doubted that suction gas engines and producers of moderate power and modern construction do, in fact, give far better results as regards thermal efficiency than any other apparatus using solid fuel for the purposes of power generation. From figures which refer to the consumption of fuel of gas engines and producers when working at about half-load, it would appear that the B.H.P. hour can still be obtained from less than 1 lb. of anthracite under average conditions of tests. It is usually stated that the efficiency of gas-power plants falls off very considerably when the output is low; but this does not seem to be borne out by facts.

But while the performances of suction gas power plants are shown to be astonishingly low under test conditions, inasmuch as those conditions can never be maintained in everyday factory service, it is desirable to know how they are affected. No account is taken of the wastage of coal in consequence of the producer being put in the charge of men more or less acquainted with their duties, and, therefore, more or less careful to obtain those conditions which will result in economical working. The factory owner also desires to know what he can expect the average consumption of a gas engine and producer to be when the engine is working throughout the day under loads that are ever varying according to the work passing through the driven machines. He wishes to know how far the test figures will be affected by the unavoidable losses due to the continued slow combustion of the fuel during stand-by hours. He also requires information as to probable total fuel consumption when desiring to fix upon the maximum capacity of an engine he is about to purchase, as though he wishes to provide plenty of margin to cope with future extensions, or to minimize the effect of the development of a fault in either the gas producer or the engine, which may temporarily restrict the amount of power available per explosion, yet he does not want to put down a larger engine than is necessary, if that larger engine will result in a greatly increased bill for fuel. It is impossible, in the majority of cases, to compute, other than approximately, the average load upon the ordinary factory engine hour after hour under working conditions. It is possible to take account of the coal consumed over a period, and obtain the figures that give the average hourly consumption of fuel—figures which will include the stand-by losses as if they were part and parcel of the fuel consumption during working hours. What are believed by the author to be reliable figures in this connection have been compiled mainly from reports forwarded to the makers of the engines and producers by the users, while a number refer to installations working under his own personal supervision.

In order to show clearly the relation of rated H.P. to hourly consumption of fuel, the accompanying chart has been prepared. It will be observed that, notwithstanding the great divergence that

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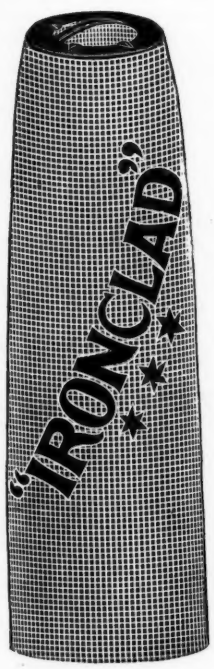


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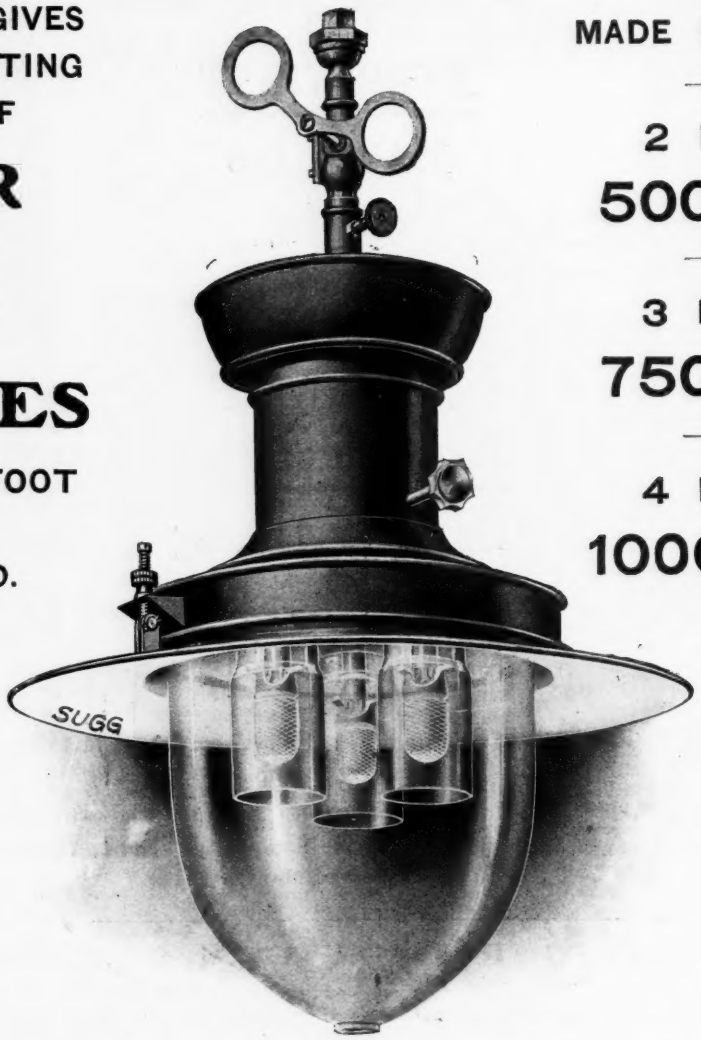


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must exist in the different conditions that apply in individual installations, the results, as plotted, are more uniform than one would expect to be possible. Only in one or two cases do the performances nearly approach the figure that would be reached if the fuel consumed amounted to 1 lb. per rated B.H.P. hour, even when, as in all the cases, stand-by and all other losses are included. It appears that practice, as represented by such figures, well bears out the claims advanced by the makers of suction gas engines and plants. Speaking generally, it would appear that the average consumption of fuel of suction gas plants is at the rate of 0·6 lb. of fuel per rated B.H.P. per hour, inclusive of all losses.

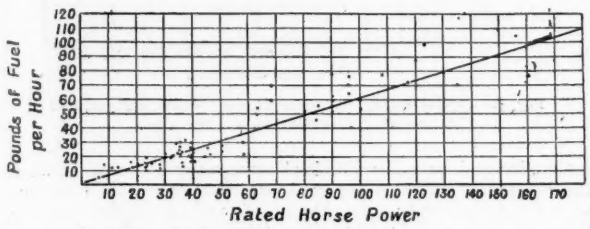



**Fig. 2.—Actual Hourly Consumption of Fuel, including Variations due to Different Grades of Fuel, Load Fluctuations, Different Load Factors, Length of Stand-by Periods, Ability of Attendants, Rate of Combustion in Producer, &c.**

The more one ponders over the results as set forth in the chart, the more one wonders that so much power can be procured for so little fuel. Take the group of engines between 30 and 50 B.H.P. In a score or more of engines, all working with different kinds of fuel, in different districts, in charge of men of different ability, driving machinery at work for a different number of hours per day, and with a different load-factor, and with a constantly differing rate of output, involving, apart from differences in size and style of producers, different rates of fuel combustion per unit of fire area, it is to be noted that a difference of 10 lbs. of fuel per hour, or thereabouts, represents the higher and lower limits of fuel consumption. This is a record that stands unrivalled by any other form of prime mover in units of equal size. Can any steam-engine enthusiast imagine any boiler-house where the stoker is expected to fire not more than 20 to 30 lbs. of coal within an hour, to feed an engine taking steam to generate a maximum of 40 rated H.P.? Even with improvements in steam-engine practice made in recent years, no type exists that, with an efficient boiler, can be sold at a price and run for such a cost as will successfully compete with the gas-power plant. Some figures are given which, emanating from actual users, show beyond doubt that for moderate powers suction gas engines and plants are preferable to steam-engines, even when the fuel required for the latter can be purchased at a fraction of the cost of anthracite.

But, apart from the questions of comparisons already mentioned, it must be remembered that, to obtain the best results from a gas-power plant, it is not only the production of good gas that matters, but also the admixture of the gas with a suitable quantity of air to form an explosive mixture within the walls of the engine cylinder. Upon the efficacy of such proportioning of the mixture on the part of the attendant, depends the amount of energy to be obtained per working stroke; and thereby the power and economy of the engine is at once affected. That such low hourly consumptions can be so universally obtained with suction gas-plants, proves that the attendant is powerless to affect economy to any appreciable extent, and, conversely, that the necessary manipulation is so readily learned that the factory owner can safely rely upon uniformly economical working.

In many cases, owing to carelessness or neglect, the stand-by losses are permitted to approach 10 lbs. per stand-by hour, instead of from 4 to 5 lbs., as is the usual figure in practical working. The lowest stand-by consumption known to the author is one of 1 lb. per hour. But this is rarely obtained; it being necessary, in order to ensure the fire being in a fairly active state for ready quickening in the morning to the gas-making temperature, to allow rather more air to pass through the furnace than is there implied. A change in the direction or intensity of the wind may result in letting the fire die out if combustion is too slow; and it is therefore deemed to be more prudent to ensure a prompt start in the morning than to cut down the stand-by losses to the uttermost.

From the point of view of the power user, no saving, even though it might be a large one as regards fuel consumption, would be of practical service if the working of a suction gas engine were to be unreliable or constantly subject to sudden interruptions from derangements of a temporary character. Much has been stated at various times with respect to the lack of strength, or "sensitiveness," of some portions of the mechanism of a gas engine, which makes it unreliable. But, after all, the question of reliability is largely dependent upon the ability of the attendant. If the driver fails to detect the development of a defect, and omits the "stitch in time," it is indisputable that a gas-power plant is more liable to sudden interruptions than steam. This does not infer that it is necessary for the attendant to stand by the engine during the whole period of working. Occasional inspection only is called for; but this should be given carefully, thoughtfully, and systematically. Experience soon shows the parts most likely to give trouble; and once these are kept under watchful care, long-continued operation is secured. Throughout the world there could no doubt be mentioned many instances in which long-continued non-stop runs have been made. Information given with regard to several installations, collected almost at random, must emphasize the fact that there is not really much to choose between steam and gas engines with regard to reliability. In fact, a statement made by, or on behalf of, the Workington Bridge and Boiler Company, well summarizes the matter in question: "As regards reliability, there is practically nothing in it between the two; possibly the steam plant has the advantage, if anything, as regards actual stoppage." This is the opinion of the firm in question, after making a change from steam power, comprising a compound, horizontal, enclosed type of engine, with forced lubrication, supplied with steam at 80 lbs. pressure from a Lancashire boiler. This almost equal reliability has been obtained simultaneously with a reduction in working costs from 1·195d. to 0·452d. per unit, including fuel, labour, oil, water, repairs, &c. From the examples he quotes, the author does not intend to infer that in every conceivable case gas power would be preferable to steam. Circumstances arise in individual cases where the claims of each have to be closely considered; and in a number of instances, he has felt it his duty to advise his clients to adopt steam power rather than gas.

Recent improvements in design have done much to increase the elasticity of the gas-engine. The old comparatively slow-speed engine with "hit-and-miss" governing is still looked upon by many engineers as being the most economical type. But, in the author's experience, the most ardent adherents to this opinion are the commercial representatives of engineering firms who exclusively offer engines governed on the "hit-and-miss" system. He has noticed more than once a somewhat sudden abandonment of such opinions by these gentlemen, when the firms they represent put an engine with throttle-governing mechanism upon the market. At the present time, most British makers are offering engines of both types of speed regulation; but there can be little doubt that if no question of price came into consideration, and if no choice were to be submitted, users generally would accept the throttle-governed engine, and admit its great advantages. It is not the fractional saving of coal of one method of governing over the other that matters, even if this were positively in favour of either; but it is the greater smoothness of running, the graduated force derived from consecutive explosions instead of a greater or less number of explosions of full intensity, that make for so distinct an improvement, while the diminution of working stresses in the more important working parts gives consequent longer life. But there is another improvement that has synchronized with the development of the throttle-governed engine, and which has been somewhat overlooked, or, at all events, not properly appreciated; and that is the increased rotative speed of the latter types of gas-engines. It has frequently been contended that a quick-running engine must of necessity be inferior to one that makes but a comparatively few revolutions per minute. It is unnecessary for the author to discuss this question—facts speak louder than words. In the author's opinion, the increase in the rate of power generation per unit of time, and consequent greater ability to deal with sudden increases of load, without the slowing of the engine, is a very decided improvement.

Engineers being accustomed to refer to the brake horse-power (foot-pounds-minute rating) of an engine, are apt to regard this as being the sole consideration when selecting sizes. But it should be remembered that it does not necessarily follow that a slow-speed engine would be equally as satisfactory as a quick-revolution engine of equal horse power under all circumstances. For any engine to be successful under working conditions, it is necessary that the rate of generation of power shall be equal to the rate of absorption of power. Machinery of some descriptions demands an output of power, for perhaps but a few seconds, much greater than that required over a longer period. Every gas-engine expert knows that, under ordinary factory conditions, when the load is variable, the sequence of explosions occurring is far from uniform. In a "hit-and-miss" governed engine, for example, there may be as many as twenty or more consecutive explosions during a count lasting one minute, while for the remainder of the count only three or four in sequence are required by the load. During the whole minute, the rate of power generation may be well within the capacity of the engine on the horse-power-minute basis, yet during the time of greater stress the rate of power absorption might be more than that of generation, and, involving reduced speed, as a consequence still further limits the ability of the gas-engine to deal with the momentarily excessive load. It will be apparent from this that if the engine were to be no larger with regard to ultimate output capacity, but of quicker revolutions, the rate of power generation would be able to cope more successfully with momentary overloads. The higher speed of revolution that is now common practice, coupled with the improved method of throttle-governing, undoubtedly brings the gas-engine into a more favourable position to withstand the criticism of lack of overload capacity that has so frequently been levelled against it.

The next matter referred to by Mr. Tookey is the considerable improvement that has recently been effected in connection with methods of lubrication. In the latest types of gas-engines, there appears to be a fair degree of uniformity in oil consumption, to some extent independent of size. In all the records that the author has been able to collect, there are very few reliable figures which indicate the consumption of water for washing the gas, for generating water vapour in the producer, and for cooling the

engine cylinder. The reason for this is that the water service is taken from the mains supplying the other portions of the factory; and the only meter readings available are those which refer to the water consumption for the factories as a whole. The quantity of water used greatly depends upon the men in charge. Some evidently find it advisable to run a fairly copious supply through the coke-scrubber, in order to obtain cool gas, probably when the connections are short, and little atmospheric cooling is possible. In other instances, there is no doubt that more water is used than is absolutely necessary. Depending upon the situation of the engine-room with regard to the factory as a whole, and also upon the class of work undertaken, so does the cost of attendance vary. For example, in water-works the cost of attendance is higher than in the case of ordinary factories, where it is possible for the driver to fill up time not required for the operation of the plant by doing useful work elsewhere. But even in such cases, it should be remembered that the attendant is required to keep the pumping machinery, as well as the engines, in good order. Again, in many systems of works' cost keeping, the time spent in making repairs is included; while in others expenses of this nature are treated separately, all repairs being effected by some outside contractor. Whether an engine be small or large, the wages of the attendant varies only with the standard rate for such work in the various districts. In some instances, the wages cover all the working hours of factory operation; but in others, day and night shifts are employed, with occasional relief men. The reputed costs for attendance for a number of installations vary from 2d. to 14·6d. per working hour of the engine, based upon the wages actually paid. But in some cases repairs are included, while in others allowances have been made for the time that is spent on work outside the actual attendance upon the engine and producer. It can be claimed, without fear of contradiction, that suction gas engines and producers enable users of power to obtain the means of driving their factories at extremely low cost; and in these days of keen commercial competition the facts suggest that they may well consider whether it would not be economical to instal gas power in preference to existing methods of power generation, which, though probably adequate as regards power, and reliable in everyday work, are inferior to gas-power installations in respect to the whole of the working expenses attached to them.

Low cost of operation, however, would not in itself be a sufficient basis for comparison. Consideration must also be given to the amount of repairs necessary and the expense attached to renewals. Information collected shows that for periods varying from one to seven years the expense for upkeep of the gas-power plant is practically negligible. The author's experience in this matter extends over many years of working of individual installations; and, with but one or two exceptions, he can confirm the statements made by the users of the engines. Naturally, much depends upon the attendant; and if compensation for wear and tear be neglected, and if the "stitch in time" is not given, the engine will continue to operate until "something happens." But then either a big bill has to be faced for an expensive overhaul, or a smaller amount is spent in making as good a job as possible for the money. The chief items of expense occur in the renewal of piston rings, refacing and, perhaps, renewal of exhaust valve, and reboring or renewal of cylinder liner. The bearings require occasional refitting, but rarely need relining. As far as the piston rings are concerned, the usual rate of renewal is at the rate of one a year. The exhaust-valve may need to be replaced about every four or five years; while the life of a liner and piston can be taken as an average at about seven years. Of course, these periods vary according to the actual number of hours worked during the periods referred to, and according to the attention given to minor matters—such as rebushing of levers, and replacement of worn pins and spindles, which, if neglected, may cause excessive deterioration of other working parts. As far as the producer is concerned, the fire-bricks lining the generator require to be renewed about every two years, for which the material costs little; but the time occupied in dismantling and re-erecting runs into about three days. Generators made with sheet-steel casing will usually require patching around the portion exposed to the action of the heated moist gases within the ashpit after about five years of work, and perhaps renewal of this portion about every seven years. Cast iron is preferable for this portion of the apparatus, but is only used for the smaller powers on account of first cost. Fire-bars will be wanted about every two years, or at longer periods, unless the fire is worked at a high temperature, arising from an insufficiency of steam, which causes burning out. The cost of these renewals and repairs, which from their recital would appear to be somewhat high, is not actually more than would be required to cover the cost of similar work in connection with steam-plants, including the cost of cleaning, scaling, and preparing boilers for inspection, repairs to feed pumps, and other auxiliary apparatus. Indeed, one firm with an engine and producer of 120-H.P. capacity, estimate to save £7 per annum over the charges incurred for the upkeep of the steam plant previously in use.

For the purpose of computing the average cost of installing gas-engines and suction gas producers, the author has decided not to take into account any approximate figure for the cost of space occupied, or for any special buildings erected for their special housing, owing to the very few instances that occur in practice when it becomes necessary to do otherwise than fit them up in some corner of a factory already in existence. The prices indicated in the accompanying chart include the cost of the engine, producer, pulley, water-circulating tanks, piping (to what

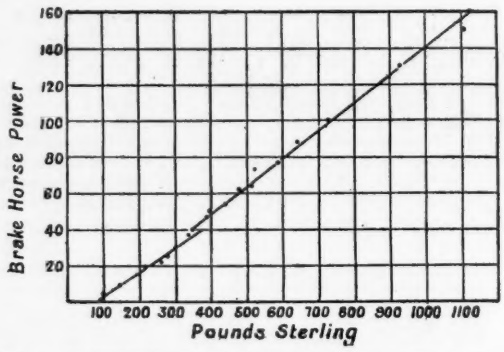



**Fig. 3.—Capital Outlay, including Engine, Producer Pipes, and Accessories, Foundations, and Erection.**

gas-engine makers call "standard arrangement"—that is, when the component parts are disposed within about 20 feet from one central point), foundation and builders' work, and labour in erection. As a basis, the ruling prices listed by two different makers have been plotted; additions being made for the builders' work and for labour, according to the author's experience of what may be considered average "fixings." These prices are probably on the high side, but will be quite sufficiently correct for rough estimating purposes. It will be seen that from 150 to 50 B.H.P. the total cost is at the rate of about £7·5 to £8 per B.H.P. From 40 B.H.P. downwards the rate per B.H.P. increases; ranging from about £9 to £11·5 in the smallest sizes.

One of the most successful engines that have been brought to a high degree of efficiency and reliability of late years is the internal combustion engine using heavy liquid fuel, and operating upon the Diesel principle. Now that the early patents have expired, quite a number of engineering firms, both in this country and on the Continent, are taking up their construction; and the future seems to promise some keen competition between the two types in the industrial world. There is no doubt the Diesel engine, as made by firms possessing wide experience in its design and operation, permits a nearer approach to the ideal efficiency with regard to the conversion of heat-units available into work than any other motor yet produced. Repeated tests have shown that as much as 42 per cent. of the total heat value of the fuel is represented by the work performed upon the piston of the engine, as recorded by the indicator; whereas the equivalent of a consumption of 0·7 lb. of anthracite per B.H.P. with a combination of gas-engine and suction gas producer, would represent a thermal efficiency on the I.H.P. basis of but 31 per cent. The consumption of liquid fuel per B.H.P. with a Diesel engine is usually at the rate of 0·45 lb. per hour. The price of the oil fluctuates according to the ruling market prices, and for the present purposes can be fixed at 50s. per ton. At this rate, the cost per B.H.P. hour is about 0·12d.

Upon the basis of 0·7 lb. of anthracite per B.H.P. hour at 30s. per ton, the cost of fuel for the suction gas plant is 0·1125d. It will be seen, therefore, that, as far as fuel cost alone is concerned, there is not very much to choose between the Diesel and suction gas engines; and the decision to instal the one or the other must rest upon other considerations. One very serious consideration, to the disadvantage of the Diesel engine, is the matter of capital outlay, involving, as this does, not only increased annual standing charges for interest on the sums expended beyond the relative cost of a suction gas installation of equal power, but also the allowance for depreciation must be increased in proportion. In some instances, when the engines are of considerable capacity, and are working long hours with sufficient load to enable full advantage to be taken of the low consumption, and where local conditions are least favourable to the gas-power plant, the balance inclines to the use of the Diesel engine. But even then, the gas-power plant, calling, as it does, for attention of a less skilled nature, can frequently be run at a lower rate for attendance, while the consumption of lubricating oil is usually lower. It will be recognized from these remarks that there is no warrant for a general assumption of superiority, as far as total costs of running are concerned, in favour of either one or the other motor; but for factories in which a skilled engineer is not required by the type of industrial machinery, it will not be seriously challenged that there is no room for a Diesel engine. Even in factories where the daily supervision can be given by an engineer, and not an engine-driver, it must be admitted that, whether the superior thermal efficiency of the Diesel engine is likely to be actually shown on the balance-sheet or not, is a matter that cannot be settled merely by reading a magazine article and by giving a nod or a shake of the head to arguments for and against incompletely stated there.

Semi-stationary steam-engines combined with a high-pressure boiler with superheater, jet condenser, with two-stage or compound expansion, have come to the front during recent years. From test results, it has been found that, under full loads, the consumption of fuel per B.H.P. hour has been brought to the low figure of approximately 1 lb. of coal; and, this being so, the steam-engine has been able to show to much better advantage than ever before in competition with the suction gas engine. From the circumstances inseparable from steam generation, however, this remark-

ably low consumption cannot be maintained in actual operation with the same continuity as has been proved to be existent with the gas-power plant. It has been said that every stroke made by the steam-engine costs more to make than its predecessor. This is not so much due to the effects of wear and tear as the gradual formation of scale within the boiler, the sooting-up of the superheating tubes by the flue gases, and general lessening of efficiency, only to be restored by frequent periodical cleaning and overhaul. In the latest designs of semi-stationary engines, special attention has been given to accessibility of the boiler tubes and to the superheater, to enable the necessary cleaning to be carried out with thoroughness and despatch; but from the point of view of the gas-engine builder, this only accentuates the inherent defects of the steam plant. With a gas-engine, there is no excessive temperature or high pressure in any part of the apparatus other than within the engine cylinder, and then only for but a fraction of a second. This, in itself, is no slight recommendation, as the absence of a pent-up mass of working fluid possessing latent powers of destruction, and requiring all kinds of safety devices to avert or to give warning of the near approach to disaster, is a matter deserving of consideration, and clearly favours the gas-power plant.

A further advantage in favour of the suction gas-engine and producer is that with the latter the attendant can be engaged in other work throughout the factory, and need give only occasional inspection when fuel-charging at long intervals. With the steam plant, a man has to be constantly in attendance to keep the fire going; while it is well known that the manner in which the stoking is carried out frequently affects the fuel consumption by as much as 15 to 20 per cent. When it is remembered that for the best results to be maintained, it is advisable to adopt some system of water softening and purification, and that the cost of the whole equipment is thereby increased far beyond the cost of the gas-power plant, it will be recognized that the advantages of the latter are still further emphasized. Especially is this so when the engine is required to deal with a load much above or below the rated power of the plant, or for unsteady and widely-varying outputs. In the one case, the economical limits of condensing steam-engines are sharply defined; while the liability of sudden fluctuation of load must involve some waste of fuel from the blowing-off of the excess steam from the safety-valves, due to the natural anxiety of the stoker to have his plant ready for any emergency.

The author is strongly of the opinion that, in the near future, as in the years that have just passed, there is bound to be a great demand for the suction gas engine and producer. He has dealt only, in the present paper, with those installations in which the fuel has to be purchased from outside sources, and has not referred to the recent developments in the utilization of material that is a waste product of industrial processes—such as wood chips and sawdust, &c., from sawmills and joinery works, from cotton seeds, and similar refuse. Neither has he referred to the suction gas plants that are now available for the utilization of bituminous coal in place of anthracite. Sufficient has been said, it is hoped, to enable the actual working results obtained in practice to be appreciated at their true value.

## THE DIESEL OIL-ENGINE.

Below is the official abstract of Mr. Day's contribution.

The paper opened with arguments against the selection of an engine being made on makers' guarantees of fuel consumption, as such guarantees cannot possibly cover all working conditions, making it quite possible for the engine which gives the best results on tests to give inferior results over a long period in normal service, when items such as wages, repairs, and maintenance are included. It was urged that the judgment must be based on records of actual working results, which include all items of expenditure; and it was pointed out that, owing to the power costs of electricity supply-stations being kept on a uniform basis, and to the great majority of them being published or obtainable, these form the best available data on which to judge the working results secured with different types of plant.

The author agreed that the conditions of working in certain factories differ considerably from those of an electricity supply-station, but claimed that loss of efficiency is largely brought about by causes which are common to all places, and that consequently deductions from electricity-station figures are applicable to the great majority of power cases.

Stations having a plant capacity exceeding (say) 1000 kw.—*i.e.*, 1500 H.P.—were excluded from the main comparisons for reasons stated in the paper. The following table gives a comparison of results of the different types of plant in stations where the plant capacity does not exceed 1000 kw.

TABLE I.—*Average Cost per B.T.U. Sold.*

| Type of Engine. | Fuel. | Lubricating Oil, Waste, Stores, and Water. | Wages. | Repairs & Maintenance. | Total Works Cost. | Load Factor. |
|---|---|---|---|---|---|---|
| Steam . . . | 0·45 | 0·06 | 0·25 | 0·26 | 1·02 | 14·7 |
| Gas. . . . | 0·43 | 0·09 | 0·28 | 0·24 | 1·04 | 15·3 |
| Diesel . . . | 0·23 | 0·04 | 0·19 | 0·07 | 0·53 | 14·3 |

The great saving shown by these figures has been repeatedly confirmed by the experience of the writer, even in cases where the guarantee figures with Diesel plant have not equalled figures guaranteed and obtained on test with the previous plants.

A table was given showing the average results obtained from steam-stations of various sizes; these averages, like those given in Table I., being deduced from the tables published in the "Electrical Times," combined with information obtained direct from station engineers.

TABLE II.—*Average Works Costs per B.T.U. Sold, on Steam-Stations of Different Sizes.*

| Capacity of Station not Exceeding | Fuel. | Lubricating Oil, Waste, Water, and Stores. | Wages. | Repairs and Maintenance. | Total. | Load Factor. |
|---|---|---|---|---|---|---|
| k.w. | | | | | | |
| 250 | 0·63 | 0·09 | 0·35 | 0·36 | 1·43 | 13·2 |
| 500 | 0·56 | 0·06 | 0·27 | 0·29 | 1·18 | 13·3 |
| 750 | 0·43 | 0·05 | 0·23 | 0·24 | 0·95 | 15·4 |
| 1,000 | 0·40 | 0·05 | 0·23 | 0·21 | 0·89 | 16·8 |
| 1,500 | 0·42 | 0 04 | 0·17 | 0·18 | 0·81 | 16·9 |
| 2,000 | 0·37 | 0·04 | 0·16 | 0·21 | 0·78 | 17·7 |
| 3,000 | 0·33 | 0·04 | 0·15 | 0·17 | 0·69 | 17·4 |
| 4,000 | 0·40 | 0·03 | 0·14 | 0·20 | 0·77 | 18·8 |
| 5,000 | 0·34 | 0·03 | 0·11 | 0·16 | 0·64 | 18·7 |
| 7,000 | 0·36 | 0·04 | 0·13 | 0·20 | 0·73 | 17·9 |
| 10,000 | 0·26 | 0·03 | 0·09 | 0·13 | 0·51 | 22·6 |
| 20,000 | 0·30 | 0·03 | 0·11 | 0·16 | 0·60 | 19·6 |
| 50,000 | 0·23 | 0·02 | 0·10 | 0·11 | 0·46 | 20·56 |

Constructional features were then dealt with, and reasons given in favour of the multi-crank vertical engine, particularly for dynamo driving. For high-speed engines, forced lubrication and very complete enclosing were strongly advised.

The development of the Diesel cycle from the Carnot cycle was then briefly traced; and the following fuel consumptions given as every-day consumptions for Diesel engines of moderate size:—

| | | |
|---|---|---|
| At full load . . . . | 0·44 lb. | per B.H.P. per hour. |
| At three-quarter ,, . . . . | 0·45 ,, | ,, ,, |
| At half ,, . . . . | 0·47 ,, | ,, ,, |
| At quarter ,, . . . . | 0·62 ,, | ,, ,, |

The further advantages resulting with Diesel engines were then briefly stated as: No sparking apparatus, lamp, or burner; no carburettor or vaporizer; no back-firing or pre-ignition; no warming up required before starting; very smooth running owing to no explosion or sudden rise of pressure; cheap crude oils used; very little water used; no ashes or offensive effluents.

In regard to the question of continuous running, a case was quoted where during four years the average running time works out at $23\frac{3}{4}$ hours out of each 24, or about $1\frac{1}{2}$ hours' stoppage per week.

### Discussion.

The following is an abstract of the various speakers' remarks, as far as they specially related to gas and Diesel engines.

Captain H. RIALL SANKEY raised the question of the rating of the various types of engines dealt with in the papers. Mr. Tookey referred to "rated load," but did not say what he meant by it. This was a very difficult matter, because most people bought their engines at so much per H.P.; and if the rated load was taken as the maximum load the engine could stand (say) for 15 minutes, as he believed was often done with gas-engines, or if it were taken as the economical load of the engine, as was usually the case with steam-engines, which would stand 25 or even 30 per cent. overload for considerable periods, it was obvious the buyer was not purchasing the same thing. For this reason, the question of the "rated load" was of extreme importance. In the case of the gas-engine, the Engineering Standards Committee made a rule as to what the rated H.P. should be; but it was never published. This was that the rated H.P. for gas-engines should be 85 per cent. of what the engine could possibly do. This was in reference to gas-engines governing by missing explosions. He did not know how the rated H.P. of the Diesel engine was reckoned; but it would be important to get some expressions of opinion upon the rated H.P. of these various prime movers. He agreed that it was a simple question to put, and a difficult one to answer.

Mr. W. J. LEWIS expressed the opinion that the Diesel engine would carry the day in the end, though for factory work it was against considerable competition from steam-engines in cases where large quantities of steam were required for heating purposes. He wished to know whether there was any possibility of making use of the exhaust heat from Diesel engines. If this was so, it would be placed in a much better position in regard to this class of competition.

Mr. E. KILBURN SCOTT spoke strongly in favour of the Diesel engine, concerning the fuel economy of which there could be no question. It required less space and less foundations than steam or gas engines; and though it was common knowledge that the Diesel engine was more expensive than it need be, on account of patent rights and the small number of firms making it, this would be rectified in time, and the engine would be much cheaper than it was now. For any problem which the Diesel engine could tackle, he would prefer it in every instance to gas or steam. They had not to go far for an instance. At Chichester, there was a fine little Diesel engine electric power station, where there had been no troubles at all; and the only complaint of the man in charge was that there was nothing for him to do. He was completely against the extension of small steam plants, and strongly advocated the use of Diesel or gas engines. He hoped the Diesel

people would increase their factories and carry out the researches necessary to put up big plants as soon as possible.

Mr. H. E. WIMPERIS said that the gas and Diesel engines were bound to develop more than steam-engines. In this connection, it appeared to him that they would have to drop the use of the words "gas-engine," if the steam-engine was going to be a superheated engine, because it would then really be a gas-engine itself. Superheated steam was a gas, and one of the very best gases to use, because it had the inestimable advantage that it could be got rid of, though they could not get rid of the gaseous products of gas-engines. Thus in the future the real distinction would be between external combustion and internal combustion engines. This might lead to the triumph of steam in the end, although not as an external combustion engine, but as a kind of combined victory. If the internal combustion was to proceed at all on the lines of the development of the external combustion engine, starting with the reciprocating engine gradually getting more and more perfect, and finally end with the introduction of the turbine, which would be even more economical, it would be absolutely essential to work with some other medium than was employed at present. There were other liquids which could be turned into vapours. But steam or water was the simplest and the cheapest; and something of this sort of development, which would allow the use of superheated steam obtained by an internal combustion process in a turbine, seemed to him to be the outcome of the struggle, rather than a continuation of competition between the steam-engine as the steam-engine, the gas-engine as the gas-engine, and the Diesel engine as the Diesel engine. With regard to the latter, he had recently been over the works of a manufacturer, and could not help remarking upon the enormously strong frames and bolts; but he could not get any information as to the reason for this. The possible solution was that there was some difficulty, owing to the very high pressure at which the fuel was injected into the cylinder, in keeping the valve tight. For instance, when the piston was on the up-stroke compressing the air to 500 lbs. per square inch, when it was near the top, if the fuel-valve was leaking, there would be a very bad pre-ignition; and this seemed to him a possible reason why the cylinder had to be so enormously strengthened. If this was so, he did not see how an economical Diesel engine could be built, unless it was very expensive. He sometimes found himself in the position of having to advise in connection with the use of Diesel engines in the Crown colonies, and some of the undeveloped portions of the Empire; but he had hitherto not felt justified in recommending the Diesel engine, as it seemed to him to require expert attendance, and in the places referred to native labour only was available.

Captain SANKEY, speaking with regard to Mr. Wimperis's suggestion of using steam and gas in an internal combustion engine, said that he had a proposition before him at the present moment based on this suggestion.

Mr. H. S. RUSSELL said the question of the low fuel cost which could be obtained with Diesel engines, especially in an electric light station, depended upon the load-factor; and the figures given by Mr. Day—namely, some 15 per cent.—were about the average they usually obtained in power stations of the size in question. Probably the reason the fuel cost in a Diesel engine was so much lower than with gas or steam, was due, in the first place, to the very much higher thermal efficiency of the engine; and, in the second place, there were no stand-by losses. It was easy for makers of gas-engines and steam-engines to say that when a producer or a boiler was standing idle it only used a small amount of fuel. Mr. Tookey had given some extremely low figures; but how they were obtained he did not say. He had a lot of figures of the results obtained in actual working with gas-engines; but they did not come anywhere near those that were mentioned by Mr. Tookey. He knew a factory which was recently running with Dowson gas producers, and with gas-engines working on the pressure system, where the total fuel costs for a 500-H.P. plant for the year were 0·7d. per unit. Owing to troubles with repairs in the gas-engines, the people got tired of constantly having the works shut down, and replaced the plant by Diesel engines, which had now been running for nearly a year for a fuel cost of 0·03d. The two plants were working under precisely similar conditions. He thought this change of plant had been largely due to the stand-by losses. The Diesel plant could be shut down for the dinner-hour, and started up in half-a-minute; whereas this could not be done with gas plant. As to making use of the exhaust heat from Diesel engines, by the use of a properly constructed boiler it was possible to heat a large amount of water. He had got 20 lbs. of water to 50° or 60°. With regard to Mr. Day's emphasis upon taking practical figures, and not test figures, he said that two or three years ago an investigation was made over a large number of stations on the Continent, in order to obtain a comparison between stations using overtype superheated steam-engines and those employing Diesel engines; and it was found that in actual practice the average costs obtained with a Diesel engine were only some 13 per cent. in excess of the makers' guaranteed figures, whereas with the steam-engine the figures amounted to no less than 140 per cent. Mr. Marshall had suggested that users of Diesel engines had to put up with unreliability; but he could mention an instance of a Diesel engine in an electric light works which had run for four years for 23¾ hours per day, and there could not be much room for cost of repairs or unreliability there. In another case, a Diesel engine had run on a a battleship for 800 hours on one journey without a single stop. Comparing wages, the speaker said with a gas plant there must be separate men in the producer-house and in the boiler-house of the steam-station. With the Diesel engine, all this was done away with; so that on the average the wages could not be more than half of either suction gas or steam plants working under similar conditions.

Mr. MARSHALL said he had no figures of the cost of producing electricity when using superheated steam engines; but he complained of the figures given by Mr. Day. No explanation was given as to the type of gas or steam plant used; and under these conditions his comparison was absolutely valueless. Referring to Mr. Tookey's paper, 75 per cent. of the examples were burning anthracite coal, which showed that this was the most common fuel. He thought internal combustion engine manufacturers did not make their case good by taking examples of this sort.

Mr. TOOKEY, in reply, said he felt rather diffident in taking part in this discussion. He was only a consulting engineer, and had tried to give figures without any trade bias whatever. They had come to him through the ordinary course of compilation. Dealing with the question of the rated H.P., he said there was a certain amount of unanimity among gas-engine makers which did not seem to exist among the makers of other types of engine. The rated H.P. of gas-engines had been settled from commercial considerations; and it was going over old history to discuss the question. When gas-engines first came in, they were known as nominal H.P., based more or less on what a low-pressure steam-engine would give; but it was found that this rating was no good, and some other was necessary. Then makers began to speak of the B.H.P. the engines would develop; and they left a margin of 10 or 15 per cent. to cover themselves, so as to say that their engines would stand a limit of overload. Other makers then came along, who were anxious to get orders if they could, by hook or by crook; and they put the power under a magnifying glass so to speak. Therefore they had to realize that, as far as gas-engine practice was concerned, the rated H.P. referred almost universally to the maximum power that could be hoped for from an engine after a test of 15, 30, or 60 minutes. As a matter of practice, however, he did not believe in the makers' rated B.H.P.; and he calculated it upon the basis of taking the piston displacement of the engines multiplied by half the number of revolutions, which gave the number of impulses per minute, and divided that by four. This represented the B.H.P. of the engine in terms of 4 cubic feet of piston displacement. This was an ordinary figure for suction gas engines; but for town gas engines they could reckon upon 3½ cubic feet. The makers' figures usually coincided with this calculation within 10 per cent.

Mr. DAY said that he endeavoured to rate his engines at the load at which they were suitable to work continuously; and he had many engines in actual service continuously working at the rated loads. They could even go to 10 per cent. above it for two or three hours. Mr. Scott was quite behind the times when he spoke about patents and the small number of makers of Diesel engines. The master patents expired some years ago; and as to the number of firms, he really could not count them. He believed thirty new firms had started within the last three years in Germany alone; and how many there were throughout the world, he did not know. Last year he had gone to Hungary with a view to opening up new business, but had found five firms in one town already. He could not give Mr. Wimperis any reason for the very strong frames and bolts to which he had referred.

## Sixth Meeting of the American Gas Institute.

The sixth annual meeting of the American Gas Institute will be held at St. Louis, Mo., on Oct. 18 to 20, when the following papers will be read:—

"Intensive Scrubbing and Condensing of Gas," by L. E. Worthing, of Detroit.

"The Manufacture of Illuminating Gas in Bye-Product Ovens in the United States," by W. S. Blauvelt, of the Semet-Solvay Company, Detroit.

"Report on Verticals at Providence, R.I.," by Carroll Miller, of Providence.

"Report on Verticals at Manchester, N.H.," by W. G. Africa, of Manchester.

"Turbo-Blower," by an Engineer with the General Electric Company.

"Production and Market for Sulphate of Ammonia," by an Engineer with the New England Gas and Coke Company, of Boston.

"Tar Distillation and Market for its Bye-Products," by Alan D. Whittaker, of Atlanta.

"Actual Leakage in Unaccounted-for Gas," by J. D. von Maur, of St. Louis.

"District Holders and their Place in a Distribution System," by R. M. Griswold, of Denver.

"Flow of Gas in Mains," by J. W. Battin, of Detroit.

"U.S. Government Report on Electrolysis," by S. W. Stratton, of the Bureau of Standards, Washington.

"Pacific Coast Conditions," by John A. Britton, of San Francisco.

"Photometric Work," by C. O. Bond, of Philadelphia.

"Cost and Results Obtained from Automobile Delivery," by L. R. Dutton, of Wyncote.

"Valuation of Public Utilities," by H. C. Abell, of New York City.

There will also be some Committee reports, and the report of the Editors of the Wrinkle Department and Bureau of Information. It is possible that arrangements may be made for a lecture on "Some Recent Developments in Gaseous Combustion."

# REGISTER OF PATENTS.

## Incandescent Gas Lighting and Heating.

Cuss, C. T., of Swindon.

No. 13,284; June 1, 1910. No. 16,677; July 13, 1910.

This combined invention relates to a system of incandescent gas lighting and heating, especially applicable to train lighting.

In incandescent gas lighting which at present obtains, the patentee says, numerous difficulties are met with—among others, the gas-nipples, which are of exceedingly small diameter, frequently require cleaning, while a high efficiency cannot be obtained with small units of light. The object of the invention therefore is to greatly increase and maintain the illuminating efficiency obtainable from coal, oil, or other gas, or mixed gases, and also to render unnecessary or modify all the parts of former appliances which have given most trouble, while at the same time providing the desirable small units of light, without sacrificing efficiency.

To accomplish this, high-pressure combustible or air is used to draw air or combustible respectively through a regulator and injector, and thus to supply a service to distributed points of consumption. The igniting system is so arranged that before ignition a rich mixture or neat gas is admitted to the main lighting service in proximity to the injector in order to displace the air from the whole system, and provide a rich mixture to the burners; while the supply of combustible is thereafter reduced to the normal supply.

## Treatment and Purification of Ammoniacal Liquors.

Lowe, F. R., and Ely, B., of Pye Bridge, Derby.

No. 19,074; Aug. 13, 1910.

Primal ammoniacal liquors as produced during the distillation or carbonization of coal, &c., either before or after treatment for the extraction of ammonia, are (the patentees mention) extremely difficult to purify, in order to render them fit for discharge into rivers or water courses—a difficulty almost entirely due to the presence of tar oils and phenoloid bodies. It has hitherto been proposed to improve the condition of such liquors by deodorizing them by bringing them into sufficiently long and extensive contact, at effective temperatures, with charcoal. This is effected by employing several vats, each provided with a false bottom and a false head, both pierced with numerous small holes, and between which charcoal is enclosed. The vats are arranged in series and connected together, the liquor ascending in each vat in succession.

The present invention relates to means for overcoming the difficulty referred to, by a combination of filtering, absorption, chemical, and bacteriological processes, in the following manner: The primal ammoniacal liquors, or the waste liquors resulting therefrom, are first allowed to flow through tanks containing beds of various grades of coke, coke breeze, and the like filtering media, in order to remove all suspended matter, which, if allowed to remain, would act as a carrying medium for the tar oils and the phenoloid bodies. The liquor, after being so filtered, is then passed into a tank, where it is intimately mixed with a quantity of animal charcoal. The liquor and the animal charcoal then pass into settling tanks, where, in the absence of suspended matter other than that due to particles of charcoal, chemical and bacteriological action takes place, with the result that the animal charcoal takes up any free ammonia present and the whole of the tar oils and phenoloid bodies.

The chemical and bacteriological action is, they point out, due to mould developing on the charcoal, and which development of moulds hastens the absorption of oxygen from the atmosphere and the decomposition of thiosulphate into sulphuric acid and free sulphur. The decomposition is represented as follows: $Ca,S_2,O_3 + O = Ca,SO_4 + S$. At the outlet of the settling tanks the effluent, or waste liquor, is said to be sufficiently pure to permit of its being discharged into rivers or streams. Any fixed ammonia which may be present in the outflowing liquors can be extracted by any of the well-known processes.

From the charcoal used in the process, any free ammonia present (together with the tar oils and phenoloid bodies) may be recovered by distillation, or the charcoal can be subjected to the action of heated air, and the ammonia, tar oils, and phenoloid bodies allowed to evaporate. The charcoal can then be used over again in the process.

## Inverted Incandescent Burners.

Coventry, W., of Pendleton.

No. 19,292; Aug. 17, 1910.

This invention relates to burners for use with incandescent mantles—more particularly for lighting with petrol carburetted air, though applicable also for use with ordinary coal gas.

The customary construction of such burners with regulators for the inlet of the vapour and air, or for the inlet of the gas and air separately, is found by the patentee not to be so effective as to adjust the flow of gas from the nozzle of the burner and at right angles to the direction of flow thereof or to the longitudinal axis of the burner, which adds "greatly to the efficient working of the burner."

As applied to a burner in which petrol vapour and air are fully mixed in the proper proportions before reaching the burner, the burner is constructed with an inlet nozzle or valve, through which the gaseous mixture is delivered at right angles into a passage controlled by a tapering spindle or valve, and an expansion chamber of suitable diameter into which the gaseous mixture flows from the valve. At its lower end, the expansion chamber is fitted with a tube and outlet nozzle, which latter is sealed at its lower end. Outlet apertures are formed in the sides to cause the gaseous mixture to flow laterally; and these apertures are covered by a perforated sleeve, which can be rotated or raised and lowered so as to increase or decrease the operative size of the outlet apertures, and thereby control and regulate the outflow of the gas.

As applied to coal-gas burners an air inlet chamber is substituted for the expansion chamber; but in other respects the burner is practically as described.

## Retort-Furnaces.

Westphal, C., of Berlin.

No. 24,018; Oct. 17, 1910.

This invention relates to vertical retort-furnaces particularly intended for burning limestone for the purpose of obtaining carbonic acid gas, and relates to that type of furnace in which the retort proper is constructed independent of the outer masonry, and in which the heating gases are admitted between the retort and the outer masonry, the retort being supported in position by means of retaining blocks built into the outer masonry.

## Radiation Pyrometers.

Foster, C. E., of Letchworth.

No. 29,097; Dec. 15, 1910.

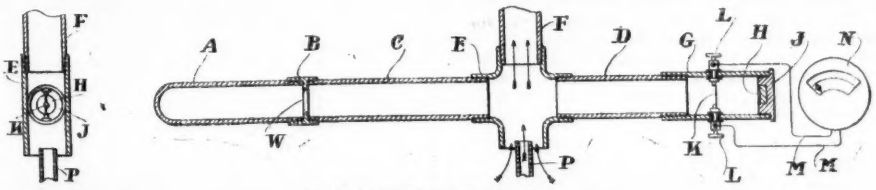
This invention relates more particularly to radiation pyrometers—that is, pyrometers in which the measuring portion sensitive to heat is not subjected to the actual temperature to be measured, but is, instead, only affected by a part of the radiant heat emitted by a body at that temperature. The object of this invention is to provide a self-contained pyrometer of the radiation type, adapted to measure the temperature of the interior of furnaces, &c.

The pyrometer, according to this invention, may be considered as comprising two main parts—the heat-transmitting part, being the tube whose closed end is raised to the temperature to be measured; and the heat-sensitive part, which is subjected only to the heat radiated from the heat-transmitting part, and by means of which the actual measurement is made. These two parts are connected so that their relative positions remain always the same as when the instrument is calibrated. Means are provided for preventing gases from passing from the heat-transmitting to the heat-sensitive part; and arrangements are made so that the heat-transmitting part may be exchanged or re-placed in case of damage. Ventilation is provided for the pyrometer structure, so that gases passing out of the heat-transmitting part may be carried away before they can reach the heat-sensitive part. This ventilation may be natural—due to the tendency of heated air to rise—or if may be forced, as by bringing an air supply to the pyrometer. If the latter, the air supply may pass between the heat-transmitting and the heat-sensitive parts in a direction more or less transverse to the line connecting the two parts or may be in a direction from the heat-sensitive toward the heat-transmitting part. Alternatively, a screen of some material, more or less transparent to heat radiation, may be interposed between the two parts of the pyrometer—for instance, a thin sheet of mica. Adjacent to this screen, and on the side remote from the heat-sensitive part, is an opening for the escape of gases in case of rupture of the heat-transmitting part while in use.

A longitudinal section of the pyrometer and a transverse section are shown, in which A is the heat-transmitting part of the instrument, consisting of a closed-end tube, attached to the body tube C by a socket B. D is a continuation of the body tube, and between C and D is the ventilating device, which in this case consists of a cross tube E. The heat-sensitive part of the pyrometer is contained in the receiving tube G and comprises a concave mirror H in the cell J. The mirror is arranged to receive radiant heat from the closed end of the tube A, and concentrates it upon the junction of a small thermo-electric couple, provided with a small heat-receiving disc K. The circuit of the thermo-electric couple is completed through the insulated terminals L, the leads M, and the millivoltmeter N. By suitable calibration, the indications of the millivoltmeter N show directly the temperature of the closed end of the tube A.

If the ventilation between A and G is to be natural, it will depend on the tendency of heated air to rise, setting up a transverse current in the direction of the arrows in fig. 1. This effect will be accentuated if the cross tube E is fitted with a vertical extension F. On the other hand, if forced ventilation is desired an air-jet may be used as shown at P.

The mirror H may be arranged so that it throws on K a focussed image of the closed end of the tube A. Alternatively, a sharp-edged opening W may be arranged in the socket B; and the mirror may throw a focussed image of W on the receiving disc K. This construction will be in accordance with patent No. 30,478 of 1909. It is a construction said to be generally preferable, because the operation of the instrument is then more easily made independent of the exact length of the tube A which is raised to the desired temperature.




Foster's Radiation Pyrometer.

## Gas-Heated Smelting Furnaces.

DELLWIK-FLEISCHER WASSERGAS G.M.B. H., of Frankfort-on-the-Main.

No. 30,295; Dec. 30, 1910. Dated claimed under International Convention, Dec. 30, 1909.

This invention relates to water-gas-heated smelting furnaces provided with flues for heating the air and for the escape of the products of combustion and with valves serving to exchange the paths of the products of combustion and of the air. The flues are placed side by side, so that the incoming air is heated both by conduction of heat from the neighbouring flues through which the products of combustion pass, and by the heat stored in the walls of the flue by the passage through them of a previous current of combustion products.

Furnaces of this kind consist of a pair of concurrently working main combustion chambers connected by a passage of reduced area. The air and gas inlets debouch in small combustion chambers placed at one side of the first main combustion chamber and close to the intermediary passage; and the exhaust gases leave the second main combustion chamber through outlets placed at the side of the chamber. The air and gas meet, mix, and ignite in the small combustion chambers before passing over the hearths. The object of introducing small quantities of air and gas at an intermediate point of the combustion chambers is said to be to compensate for the heat lost by the products of combustion during their passage through the first combustion chamber.

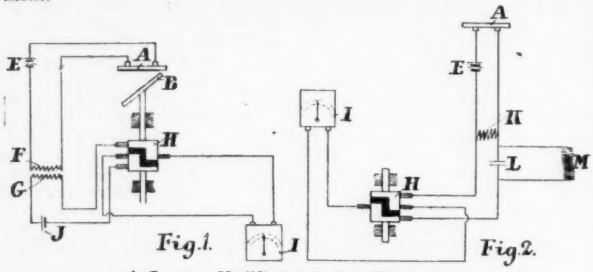
In a furnace constructed in accordance with the invention, the two main combustion chambers are placed in axial alignment; and the air and gas are admitted directly to the furnace through the outer end of the first combustion chamber and pass out through outlets situated at the outer end of the second chamber. In order to allow the use of only a single combustion chamber, a gas inlet and an aperture, alternately serving as an inlet of the hot air and as an outlet for the exhaust gases, are provided at a point intermediate of the two combustion chambers; while to allow the incoming air to be highly heated during its passage through the flues, which are maintained at a high temperature by the heat of the gases passing through the adjacent flues through which the products of combustion are passing, the adjacent air and exhaust gas flues of the recuperator are interdigitated so as to provide large heat-absorbing and heat-radiating surfaces.

## Photometers.

KUMMERER, W., and the GESELLSCHAFT FÜR ELEKTROTECHNISCHE INDUSTRIE MIT BESCHRÄNKTER HAFTUNG, of Berlin.

No. 11,111; May 8, 1911.

Selenium photometers are, as the patentees point out, already known in which the selenium cell used can be rapidly and alternately brought out of the range of a known source of light into the range of the source of light to be measured; and the subject of their invention is a selenium photometer in which all disturbing influences are avoided, and which therefore "allows a very exact measurement of the sources of light." The cell used is supplied with direct current which is altered into pulsating direct current; and this current (which may be regarded as compounded of direct current and alternating current components) is first wholly or largely separated from its direct current component and then commutated and passed through a measuring instrument. The errors arising in the commutation are thus diminished to (say) the thousandth part; "so that they do not seriously influence the measurement."




**A German Modified Selenium Photometer.**

Fig. 1 shows diagrammatically such a photometer. A is the selenium cell which, by the aid of the rotating mirror B, is illuminated alternately by the sources of light C and D. E is a source of direct current from which the selenium cell is supplied in series with the primary winding F of a transformer. To the secondary winding G of the transformer there is connected, through the commutator H upon the spindle of the mirror, the measuring instrument I. This latter may, for example, be an ordinary moving coil instrument "of almost any desired sensibility." In the secondary circuit, there may be connected a small source of direct current J.

The same result as is obtained by the transformer F G can also be secured by the use of a condenser or other known means. Fig. 2 shows a simple example of a connection of this kind, in which the revolving mirror and the sources of light are omitted. The selenium cell A is in this case connected with a source of current E across an ohmic or inductive resistance K. In parallel with the latter is a condenser L, in the circuit of which is the commutator H and the measuring instrument I. The direct current flowing through the cell A passes in this case through the ohmic or inductive resistance K, while the variations in current produced in the cell by the alternations of illumination flow in the main through the condenser L and, after their commutation, operate on the measuring instrument I in the circuit. In this case also a small direct current can be superposed upon the commutated current —*e.g.*, by connecting in parallel with the condenser a large ohmic resistance M.

This photometer may be used not only for the comparison of sources of light, but also for all other purposes in which a comparison of magnitudes of illumination can be applied—for example, to measure the transparency of substances, and so on.

# MISCELLANEOUS NEWS.

## SHEFFIELD GAS WORKERS.

### Increase in Wages.

A meeting of Sheffield gas workers was held on Sunday, in the Burngreave Hall, to consider the Gas Company's reply to the request of the employees for an increase of wages, and for "recognition" of the Union leaders. The latter condition was granted, as a preliminary to personal negotiations through a deputation headed by Mr. Charles Blackburn, the District Secretary of the National Union of Gas Workers and General Labourers. Now that a settlement has been arrived at, says the "Sheffield Independent," its terms are "far more generous than the most sanguine dared anticipate. The Gas Company have done the thing handsomely; and Mr. Blackburn merits the warmest congratulation on a triumph of sagacious leadership. It means an increase in wages of £3000 a year." That the men should be pleased, is evident from remarks made by Mr. Blackburn himself at the meeting. He said: "We have not got all we asked for; but what we have got exceeds my anticipations. It is splendid. Let us treat the Company with the same honest respect that Mr. Hanbury Thomas treated your representatives with. While that feeling exists, I am sure we can go on having conditions materially improved. That is the spirit to cultivate."

The terms of the agreement signed by Mr. Hanbury Thomas, as Managing-Director of the Company, include, as already stated, the recognition of the men's Union. As to wages, the Directors express the desire that their workmen should be liberally paid, and intimate their willingness to grant an advance of 3d. per shift to all classes of eight-hour shift men, and 1s. per week to all able-bodied men in their employ except those specially dealt with. The classes exceptionally treated were then mentioned. It was added that any workman having a grievance must see the Works Superintendent first. If the grievance is not satisfactorily dealt with, the Union Secretary may write the Engineer, who will go into the matter, and, if necessary, discuss the grievance with him personally. Mr. Hanbury Thomas's letter concluded: "In communicating their decision, the Board request me to point out to you that their ability to reduce the price of gas is due to causes wholly unconnected with labour. As a body, our workmen are paid as high wages as any gas workers outside London; and as regards the general labourers, the rate is considerably above that paid by the large works in the city, and they have in addition a week's holiday per annum, with pay." Attention was also directed to the fact that the lowering of the price of gas benefited the workers generally throughout the city, not only in regard to their personal saving, but by enabling the industrial concerns to compete on better terms with their rivals in other towns—thus increasing employment for Sheffield men.

In explaining the terms, Mr. Blackburn particularly emphasized the point that the management of the Gas Company made it clear at the beginning that no man need fear victimization for acting on the deputation. They said they would never dream of such a thing as penalizing a man because he was an official of his Union. A satisfactory feature of the clauses relating to blacksmiths and fitters was that the Company had recognized the fair-wages standard of the City Council; and some of the individual advances were as much as 4s. per week. As regarded the youths, some of whom had done men's work, the advances were, in numerous cases, as much as from 3s. to 7s. per week. The "bullers" had four hours knocked off, and received 9d. per day advance on former rates. The joint makers, some of whom had been suspended for not being at home when called for, although they received no pay for "hanging on," would now receive a retaining fee of 2s. per shift for stopping at home on call. While he agreed that the labourers' wages of 25s. per week were the high-water mark in Sheffield, he recalled that not more than 40 miles away there were gas-works labourers receiving the same pay for an eight-hours shift.

The terms of the agreement were received with acclamation by the men; and the proceedings closed with votes of thanks to Mr. Blackburn and to the Gas Company.

## AUSTRALIAN GASLIGHT COMPANY.

The Annual Meeting of this Company was held on Thursday, July 27, under the presidency of Mr. G. J. COHEN.

The SECRETARY (Mr. R. J. Lukey) having read the notice convening the meeting, the report of the Directors for the past six months was taken as read. It stated that the profits for the half year to June 30, after making provision for bad and doubtful debts, deducting interest on borrowed money, repairs and renewals, depreciation of plant, working expenses, and all other charges, amounted (with the balance brought forward) to £71,155; and the Directors recommended the payment of a dividend of 9s. per share, which would absorb £63,750 and leave a balance to be carried forward to the next account of £7405.

The CHAIRMAN, moving the adoption of the report and accounts, said it was difficult to compare the balance-sheet with the corresponding half of 1910, as that showed disastrous results to the Company owing to the unfortunate coal strike, which not only paralyzed the business of the city at the commencement of last year, but necessitated the Company purchasing coal at unprecedented prices to keep up the supply of gas, which involved them in very considerable loss, as the whole of the extra cost was met by the Company rather than that the consumers should suffer inconvenience or loss. With regard to the sale of gas, he was pleased to say that last half year showed a good increase. Naturally, the extensions now going forward in the suburbs, both new and old alike, were responsible for this satisfactory state of things; but the city itself contributed a considerable portion of the extra consumption. The quantity of gas sold during the six months was equal to an increase of 11 per cent.—a fact gratifying to the Directors, more particularly as the increase was being maintained uniformly, both as regards day and night consumption.

Continuing his speech, he said: The intimation of the Government's intention to resume the site of the works and offices at the head station, for wharfage accommodation, has not come as a surprise to your Directors, who have watched for some years past the steady increase in the extension of the wharves by the Harbour Trust Commissioners to meet the shipping requirements in Darling Harbour. Your Directors regret the contemplated action of the Government, but are prepared to negotiate for a fair settlement of the Company's claim, at the same time they trust they will not be made to suffer thereby. The Company's works have been located on this site for nearly 74 years; it is most centrally situated, and meets all the requirements of a gas-works; and it will take some considerable time to erect similar works at Mortlake, which, however, must be done before the severance from Kent Street can be effected.

The Glebe Municipal Council, who had given notice of their intention to discontinue gas lighting for public purposes in that Municipality at the end of this year, have, I am pleased to say, entered into a new agreement with the Company for a supply of lamps with inverted incandescent burners of 100-candle power in the majority of the streets of the borough, in lieu of those already in use—the installation taking effect from the 1st of January next. It having been so often demonstrated that gas is much superior to electricity as regards light and cheapness, I am at a loss to understand why councils should desire to light their municipalities with electricity, it being inimical to the interests of the ratepayers so to do. Taking the Glebe Council for an example, the Company are supplying the new lights at £4 10s. per annum, lighted every night in the year, as against £6 per lamp, the price quoted for electricity—a saving in this instance of from £500 to £600 per annum, according to the number of lights required, besides giving in every way a much better light. In this connection, I may say the Company are about to introduce the Horstmann controller; so that the lamps will be automatically lighted and extinguished.

The question of lighting the public lamps all the year round is one in which the Company fully sympathizes; but the municipal councils ought not to expect this special service, involving as it does 65 extra lighting nights, without any additional charge. The Company are always mindful of the public interests in this respect, and whenever opportunities occur reduce the price, as was the case six months ago. The present rates, owing to the lamplighting and maintenance expenses principally, are carried out without profit; and until other means can be devised to reduce these charges, I cannot hold out any hope of being able to meet the councils in the direction desired.

The Gas-Works Employees Wages Board is at present considering a new industrial agreement, in lieu of the one which expired on the 31st of May last. Some delay and misapprehension arose in connection with the preliminary proceedings. The trouble, however, has now been overcome; and I am hopeful that no further friction will arise, but that the terms of agreement will be amicably settled.

The Commonwealth land-tax is an additional and unexpected charge to bear—amounting in the Company's case to about £5000 per annum. These additional burdens tend to delay for a time any consideration for further reducing the price of gas, which is much to be regretted.

The Company have issued the whole of their authorized capital; and your Directors intend at an early date to apply to Parliament for power to increase same. The business of the Company has reached large proportions, and is growing rapidly. The complaints of an inadequate gas supply made in the early part of the winter were sincerely regretted by the Board, particularly as ample arrangements were made to cope with the anticipated increase in the consumption of gas. But our calculations were upset in the first place by the non-delivery of the new machinery within the specified time; and, secondly, owing to the delay in the erection of it, in consequence of a scarcity of skilled labour. As soon as the new machinery was in working order, however, immediate relief was obtained, and an ample supply of gas secured. In proof of the Directors' earnest desire to do all that is possible to meet their consumers' requirements of gas, I would like to say that mains costing about £30,000 have been ordered, and will be laid immediately on arrival; so that I hope there may be no question of shortage of gas again for many years to come.

The business of the Company is one of expansion. With regard to the lamps, while I greatly regret the lessened number, I would like to point out that it is a department which, unfortunately, admits (of late years in particular) of practically no profit to the Company. Still, with the example now being set by the Glebe Council, I hope the Company will have the consideration it deserves before other councils take the final step to discontinue gas as an illuminant for the public streets. I am pleased to say that the number of lights now in use is about 11,000, and that additions are still being made from time to time. The popularity of gas-cookers has greatly increased of late. During the past six months, the Company alone have sold 1346 stoves; making the total number disposed of to date 22,610. The day consumption of gas equals 46 per cent. of the whole sales. The gas consumers now number 98,649—being an increase of 2921 during the past half year. Fifty-eight miles of mains and service-pipes have been laid during the same period, making the total length to date 2570 miles.

The motion was seconded by the Deputy-Chairman (the Hon. Henry Moses), and carried unanimously.

There being no opposition, the Chairman declared the re-election of the retiring Directors and Auditors for the ensuing year; and a unanimous vote of thanks was accorded the Directors and officers—from the Engineer (Mr. Thomas J. Bush) downwards—for their efficient management of the Company's business.

**Gas Explosion at Clay Cross Hall.**—On Monday night of last week, there was a serious gas explosion at Clay Cross Hall, the residence of Colonel Jackson; but though the damage to property was extensive, fortunately no personal injury was caused. It appears that the family were away from home, and the schoolroom, where the explosion occurred, had not lately been used. It is stated that in the centre of the room is a chandelier fitted with incandescent burners and a bye-pass; and the presumption is that the water evaporated from the chandelier, thereby causing an escape of gas, which ultimately became ignited by the bye-pass.

## HIGH-PRESSURE LIGHTING AT MANCHESTER.

### Another Extension.

The installation of high-pressure gas-lighting for street illumination in Manchester has proved so successful that at Friday's meeting of the Gas Committee a further extension of the system was decided upon, while applications from tradesmen in the centre of the city for high-pressure lighting outside their premises for the purpose of window illumination were considered.

It was in October of last year that the first installation of high-pressure lighting was inaugurated in Manchester, when Alderman Gibson, the Chairman of the Gas Committee, turned on a 3000-candle power Keith patent inverted arc lamp on Piccadilly; 20 other lamps of half this candle power placed around that thoroughfare being lit up the same evening. Later on, the City Council, when considering the rival claims of gas and electricity for street lighting, decided that the Electricity Committee should arrange for the lighting of Portland Street; while Mosley Street, in the matter of lighting, was to be under the charge of the Gas Committee. The second installation was inaugurated last July; and so successful has this proved that the system is to be extended to Oldham Street at the request of tradesmen in that fashionable shopping thoroughfare. Tradesmen in Mosley Street applying for high-pressure lighting outside their business premises are having such schemes carried out in conjunction with the Gas Committee.

At present, the Manchester Gas Department have 60 high-pressure lamps of 1500-candle power in use in Piccadilly, Mosley Street, and St. Peter's Square; and the existing plant can deal with 400 lamps of the same power.

## STOCKPORT GAS UNDERTAKING.

### Most Successful Year on Record.

The annual report of Mr. S. Meunier, the Gas Engineer to the Stockport Corporation, was brought before the members of the Town Council at last Wednesday's meeting for adoption. On the working of the department for the twelve months there was a net profit of £26,192—an increase of £4862 on the previous year; and out of this, £19,000 had been handed over in relief of the rates.

Alderman FERNLEY, the Chairman of the Gas Committee, moving the adoption of the report, said that the year under review was the most successful one in the history of the department. There had been a steady increase in the net profit during the last six years, as follows:—

| | |
|---|---|
| 1906—£10,158 | 1909—£21,490 |
| 1907—£17,412 | 1910—£21,054 |
| 1908—£19,070 | 1911—£26,192 |

It would be remembered that quite recently a reduction was made in the price charged to consumers by automatic meter, bringing the rate—having regard to the extra cost—rather below that paid by ordinary consumers; and there had also been a reduction for large consumers. It was gratifying to find that the rental had increased by some £3690—notwithstanding the very energetic exertions of the Electricity Committee to obtain a large load, almost at any price. From the sale of coke, they had an increase of £1805; and other residuals had also realized better prices than usual. On the expenditure side, coal showed an advance of £708, which was more than counterbalanced by the less cost of carriage and cartage—namely, £930—which showed what an important matter the question of carriage was when arriving at the value of coal to the undertaking. It proved that the policy adopted by the Committee in taking this item up was a correct one, and that the charge made some time ago against the Committee by Mr. Noden—that the method of arriving at the value of coal when delivered at the works was wrong, but that it ought to be taken at the pit price—was incorrect and absurd. Dealing with the suggestion which had been made by certain members of the Council, that, in view of the prosperous condition of the gas undertaking, there should be a reduction in the price of gas, Alderman Fernley said it must not be forgotten that this was one of the Corporation's ventures which was successful. If all the undertakings of the Corporation were of this character, then one would have no hesitation in making a reduction; but they must take a broader outlook, and have regard to the responsibilities of the ratepayers, which were constantly becoming more onerous. He might point out that the cost of education, already a serious item, was likely to increase further; and then there was the outlay on the Kinder water scheme, for which they had to provide large and increasing sums, to commence next year. The Gas Committee, in not suggesting a reduction in price, did remember their obligations to the ratepayers; and they were aware of the fact that the charge for gas in the town was a reasonable one. They had regard also to the uncertainty of the coal and the residual markets. He trusted, therefore, that the Council would not, at present at any rate, listen to any suggestions for a reduction in price—suggestions that were sometimes made without due regard to the responsibilities of the Council.

Mr. BREWSTER complained that the employees at the gas-works were not on the same footing in regard to conditions and wages as similar workers elsewhere. Deputations were constantly waiting upon the Gas Committee asking them to fall into line with other employers of labour. This not only applied to the unskilled labourers, but also to the skilled workmen. As soon as a skilled man entered the gas-works, he did not know what he was. A plumber was no longer a plumber, a joiner a joiner, or a bricksetter a bricksetter—he became a kind of superior unskilled labourer. If consumers were treated fairly and the workpeople were dealt with in a proper way, the Committee would not have such a large profit to show.

Mr. HOLLIS submitted that, with regard to the employees, the Gas Committee were seeking trouble, and they would get it unless they fell into line with other employers.

Alderman ALLCOCK referred to the large leakage of gas that took

place, and said it was more than the whole amount consumed in the streets. As to the profits, he remarked that in 1905 the price of gas was 2s. 5d. per 1000 cubic feet, less 2d. Now it was 2s. 6d., less 2d. The extra 1d. made a difference of £3411. In addition, the gas now sent out was of a lower candle power. Power consumers paid 1s. 3d. per 1000 cubic feet; while the smaller and poorer consumers—the people who used the slot-meters—paid 2s. 6d. Then the General Purposes Committee took 69,850,000 cubic feet of gas per year, and paid the Gas Committee 2s. per 1000 feet and 10d. for maintenance. This was how the profit was made up. In his opinion, the ratepayers were being charged twice over for the gas they used; and he considered there ought to be a reduction to the ordinary consumer.

Alderman FERNLEY, in his reply, said it was incorrect to state that numerous deputations of the employees had waited upon the Gas Committee. Only two had done so during the last twelve months.

The report was then adopted.

## ABERDEEN CORPORATION GAS SUPPLY.

### Favourable Position of the Undertaking.

In the Corporation of Aberdeen last week, Mr. J. A. Sangster, the Convener of the Gas Committee, in presenting the accounts of the department for the year—a notice of which appeared in the "Notes from Scotland" a week ago—said he was able to announce a most successful year, with every appearance that past prosperity would be maintained.

In regard to the capital account, the amount expended thereon stood at £446,220. Of this sum, £79,381 was written off in 1897, when the new valuation was made, and the remainder had been reduced yearly until now the gas undertaking had a liability of only £132,920. The amount received for gas was £96,124—an increase of £3679 over last year. This included an increase on prepayment meters of £1800. The revenue from coke was £14,627, being less than last year by £870; but tar had brought in £11,967, an increase of £1424 over last year, or an increase on both of £554. These, with the other items, had brought in a total revenue of £125,467, as against £121,049 last year, showing an increase of revenue of £4618. Coal had cost £53,564, the material for carburetted water gas £5142, purifying material £1088, wages £11,559, and repairs £4895, in all £78,442 as against £79,679—a decrease of £1237. Distribution of gas, in which was included a sum of £1848, the original value of old meters broken up, had cost £5112, an increase of £202 over last year. Gas-stoves, including depreciation at 7½ per cent., had cost £1932; rents, feu-duties, and taxes, £6728; management, £1919; general charges, £921; discounts, &c., £4023. These were all about normal, considering the increased make of gas. The balance on the account was £25,639 (£2666 more than last year), and was carried to the net revenue account, out of which were paid the standing charges as follows: Annuities £4041, interest £3580, sinking fund £9621, redemption of annuities £1367, reserve fund £300, and renewal fund £3000; leaving a balance of £3728, which, with similar balances from former years, made up the sum of £7775 carried to next year's account. The contingent fund for the redemption of gas annuities now stood at £76,865, the sinking fund for the repayment of loans at £137,947, the reserve and fire insurance fund at £38,975, and the renewal fund at £11,228.

The increase in the make of gas this year over last was 23,294,000 cubic feet, or 3 per cent. The total quantity manufactured for the year was over 817 millions, as compared with 366 millions in 1891, 259 millions in 1881, and 146 millions in 1872—the first year of the Council's ownership—or over five times as great as the last-mentioned year. The prices charged per 1000 cubic feet for these years respectively were 2s. 6d., 3s. 8d., 4s. 1d., and 5s. Estimates had been prepared for the year just commenced, in which it was recommended that the price be again reduced to 2s. 3d. for ordinary consumers, and 1s. 11d. for power purposes—prepayment consumers to remain the same as last year, owing to the substantial reduction made two years ago, and the expense of altering the meters. To power users, the price was to be reduced 4d. per 1000 cubic feet. This was with a view to competing with suction gas, which had to some extent taken the place of the town gas supply; and he was hopeful that the substantial reduction proposed would enable users to again return to the town supply, and so considerably increase their output. The number of consumers using gas by ordinary meters was 31,742, and by prepayment meters 10,150—a total of 41,892, as compared with 33,222 ten years ago. It was proposed to abolish rentals for gas-cooking appliances as from Whitsunday last, and allowance had been made for this in the estimates for the current year. This was a policy which was gaining favour throughout the country; and wherever it had been adopted, increased outputs had been the result, particularly in the summer months, when the demand for gas for lighting was at its lowest. He would like to take the opportunity of complimenting the Gas Engineer on the very favourable result of the year's working, which had in large measure been due to the able and efficient manner in which the department was conducted by him and his staff. If cookers were used generally, it would mean extra labour; but he did not think they would require further plant for a considerable time.

The minute was adopted unanimously.

**Stretford Gas Company.**—The report and accounts adopted at the half-yearly meeting of the Stretford Gas Company showed a profit of £4521. Adding to this the balance from the last accounts, there was a disposable amount of £5836. Dividends were recommended at the rates of 10, 7½, 7, and 5 per cent. on the different classes of shares, which would absorb £4910, and leave £926 to be carried forward. It was announced that Mr. W. L. Galloway had, on the ground of advancing years, resigned the position of Chairman; Mr. W. A. Nicholls being elected to succeed him. For close on thirty years Mr. Galloway has been a Director of the Company; and for fourteen years he has occupied the position of Chairman.

## MANCHESTER CORPORATION AND GAS-FIRES.

A proposal on the part of the Manchester Gas Committee to supply and fix on simple hire, or on the three years' hire-purchase system, gas-fires and other gas-consuming devices to consumers of gas within their supply area, gave rise to considerable discussion at the City Council meeting on Wednesday last.

Alderman Gibson, the Chairman of the Gas Committee, in moving the adoption of the Committee's minutes, said that if the Council really wished to do something to mitigate the smoke nuisance in the city they would approve of the action of the Committee. There was to be a smoke abatement exhibition held in Manchester in November, and with a view to supporting the exhibition, and abating to some extent, at any rate, the smoke nuisance, the Gas Committee had decided that, after Sept. 29, they would supply and fix gas-fires free for consumers.

The opposition to the proposal was led by Alderman Wilson, who moved an amendment to the effect that the minute be referred back. He agreed that the policy of the Gas Committee in the hiring-out of gas-stoves had proved a very good thing; but it had destroyed the business of the ironmongers and plumbers in this particular line, for now the Corporation supplied and fixed stoves free, nobody bought them from tradesmen. Serious objection could not be taken to the action of the Gas Committee in this matter, because poor people could not afford to pay £6 or £8 for a gas-stove; but the present proposal of the Gas Committee, if agreed to, would mean a very large extension in municipal trading. The scheme would enable the Committee to hire out any device from a simple gas-burner, and that would be an unwarrantable interference with the private traders' business—ironmongers and plumbers. "Other gas-consuming devices" might, he added, mean anything; and being engaged in the particular business in which the Gas Committee proposed to enter, he objected to the scheme.

Alderman Frowde, who seconded the amendment, admitted that he was engaged in the same business as the mover. He argued that municipal trading had its limits; that the private individual could do some things very much better and cheaper than the municipality; and that the failure to recognize the latter was the explanation of one of the greatest leakages in municipal revenue.

Other opponents of the proposal said that if the Gas Department were able to make concessions, it ought to be in the direction of cheapening the gas to consumers, and bringing the price nearer to that charged in such places as Sheffield.

Councillor Kay, the Deputy Chairman of the Gas Committee, replied that Manchester could make gas as cheaply as Sheffield, but pointed out that so long as the Council and the people's representatives demanded a contribution of £60,000 from the Gas Department yearly in aid of rates, so long would consumers have to pay for their gas not at cost price, or anything near it.

Replying on the debate, Alderman Gibson said at the outset that it was rather unfortunate the mover and seconder of the amendment should both be in the trade likely to be affected by the Gas Committee's proposal. He (Alderman Gibson) desired to disabuse their minds, however, as to the effect it would have on ironmongers and plumbers. It was his opinion that when the system was adopted, it would add materially to the takings of both plumbers and ironmongers. It might be put this way. The Gas Committee would become travellers for the gentlemen engaged in those trades; they would be advertising their business and pushing it for them. Alderman Gibson went on to say that no one was more opposed than he was to any interference with private enterprise on the part of the municipality; but from inquiries he had made, it was clear that the business of the wholesale dealers in gas appliances was almost wholly with the gas undertakings—so far, at any rate, as the supply of gas-fires and heating-stoves was concerned. In one case, it amounted to 93 per cent. of business with the gas undertaking and 7 per cent. with ironmongers and private traders. In another case, the figures were 85 per cent., as compared with 15 per cent.; and in a third instance, the proportion was 80 per cent. to 90 per cent. of the total trade done. He asked, in the face of these figures, how the Gas Committee could be accused of injuring private enterprise in the step they proposed to take? Their best interests were represented by the letting out of gas-fires anywhere and everywhere. All the Committee asked was to be allowed to run their business in the way they thought best suited to the needs of the community.

The amendment was defeated on a vote being taken, and the proposal of the Committee approved.

### Gas Superintendent's Views.

Mr. F. Price, Superintendent of the Gas Department, discussing the subject with a Press representative, said that the Gas Committee had in mind not only the development of the gas undertaking, but hoped to bring about a considerable abatement of the smoke nuisance. "We must not lose sight of the fact," he added, "that though manufacturers have almost wholly to stand the blame for the smoke nuisance, the domestic fires are the worst offenders. Anyone entering Manchester by train in a morning—coming into London Road station, say—can test for himself the truth of this assertion. We hope to do something to check this nuisance, which is a very grave one in the city. As to the question of cost, I do not find the gas-fires in my own house dearer than coal-fires; and there is a great saving in labour, and much more cleanliness, by their use. Economically managed, there may be a monetary saving as well. We believe the policy embarked upon will encourage people in the direction desired; for it is stated that since the recent gas exhibition in Glasgow over 5000 gas-fires have been installed. Of course, many are found in the homes of Manchester people to-day; but the initial cost has probably been a barrier against their more extended use. The charge for the hire of a fire will amount to 1s. per quarter, and at the present price of gas, 2s. 3d. per 1000 cubic feet, a 40-hours' fire can be secured for this sum. Our energies will be devoted at the outset to equipping city offices, and afterwards attention will be devoted to the houses."

It is calculated that the gas-fires to be supplied by the Gas Department will burn 26 cubic feet of gas per hour. The gas-fires will be of an approved pattern, and will, as stated above, be supplied by the

department either on simple hire or on the three years' hire-purchase system. At the forthcoming Smoke Abatement Exhibition, which is to be held at the City Exhibition Hall in November, a prominent feature will be that showing the possibilities of using gas in the elimination of the smoke evil, including different models of gas-fires.

It is believed by supporters of the smoke abatement campaign in the city that the introduction of gas-fires will help to lessen the nuisance, and will be a great boon both in city offices and in private houses. These fires will save all the trouble with coal, cinders, and ashes, and in this respect bring about a great saving in labour, apart from the questions of laying fires and of general cleanliness.

### An Advocate of Smokeless Fuel and its Production.

In the opinion of Mr. J. W. Graham, the Principal of Dalton Hall, Manchester, and an authority upon smoke prevention, the only solution of the domestic smoke nuisance problem is the production at gas-works of a smokeless fuel. This means fuel out of which part of the gas has been taken and part left in. "Clearly the only people who can make it profitably," he says, "are those who can sell the gas—the one main product of this mild combustion—the Gas Committee of the Corporation, who have the domestic smoke of the city in their hands. If they would be willing to care for something a little wider than the production of gas, and would establish an improved smokeless fuel plant, they would begin a new era in the city. I don't think that anything but inertia blocks the way. They have the market in their hands, and could sell the fuel at whatever price it costs. The gas made is of a very high quality, and the tar is a very superior product to that made now by heating the coal until there is nothing left but coke. I feel sure this smokeless fuel could be sold as cheaply as coal. A serious purpose and an enterprising committee are all that is needed. The sale of smokeless fuel, even under many disadvantages, shows there is a demand for this kind of thing."

Mr. Graham added that the only way in which smokeless fuel would affect the coal famine predicted by Sir W. Ramsay, at the meeting of the British Association, would be that more of the energy of the coal would be utilized by turning it into smokeless fuel, gas, sulphate of ammonia, and tar, the total value of which was about four times that of the coal from which they were made. He understood that a private company was at present endeavouring to undertake a business on a small scale to sell an improved smokeless fuel in Manchester, but in his opinion nobody except a gas committee could do it properly.

At Friday's meeting of the Gas Committee, a Sub-Committee were appointed for the purpose of drawing up regulations in respect of the hiring of gas-fires, the scheme for which will come into operation at the end of the month.

## SOUTHPORT GAS UNDERTAKING.

### The Past Year's Working.

The minutes of the Southport Corporation Gas Committee to be submitted for approval at the monthly meeting of the Town Council to-night (Tuesday) include the report of Mr. J. Bond, the Engineer, on the working for the past financial year.

He records with pardonable satisfaction that there was an increase of gas sold amounting to 2,052,000 cubic feet, which was 4 per cent. more than shown in the previous year. The net increase from the sale of residuals was £3670. The sale of gas by prepayment meter was 11·53 per cent. of the whole consumption, and showed an increase of 9·88 per cent. on the previous year's consumption. Of the total gas supplied through ordinary meters, the Southport consumption was 330,940,800 cubic feet, equivalent to 80·42 per cent.; the Birkdale consumption 70,739,000 cubic feet, representing 17·19 per cent. of the total consumption; and the remaining 9,832,800 cubic feet, or 2·39 per cent., was consumed in the districts of Ainsdale, Banks, and Scarisbrick.

The following figures show the capital employed and the capital outstanding: Total capital expended per 1000 cubic feet of gas sold—1910, 11s. 6d.; 1911, 11s. 7d. Capital outstanding—1910, 7s. 8d.; 1911, 7s. 6d. The net profit for the year amounted to £13,400, as against £13,112. The Committee are able to pay £13,000 towards the relief of the rates, and carry forward a balance of £400. The capital account (total amount expended) now stands at £300,020, and the gas-works debt (after deducting payments through sinking fund) at £193,525.

The maximum and minimum makes of gas during 24 hours were 2,296,000 cubic feet and 991,000 cubic feet. The gas-making material used was: Coal, 47,619 tons; oil, 332 tons; coke, 844 tons. The gas made was 545,412,000 cubic feet. The quantity sold to private consumers was 474,365,200 cubic feet; gas used at works and offices, 6,280,000 cubic feet; free gas, 488,600 cubic feet. The unaccounted-for gas was 3·83 per cent.

Mr. Bond summarizes the financial statement thus: Income: Gas sold, net, £68,812, increase £501; residuals, £17,638, increase £3670; rents, £939, increase £2; cookers, £1991, decrease £37; sundries, £957, increase £628; and shop lamps, £635, decrease £25. The gross profit was £30,096, and the net profit £13,401. The gas-cookers in use at the end of the year numbered 8342, compared with 7961; while 542 new meters were fixed during the twelve months, bringing the total number in use at the end of the year up to 19,407.

**Electric Light Failure during an Operation.**—The "Nursing Mirror" says: From Yorkshire, we hear of a very regrettable incident, due to the most culpable lack of foresight. While an operation was being performed in the night, the electric light failed. Neither lamp nor candle was available; and before either could be obtained, the patient died, though the operation itself was not of a very serious nature. The correspondent who sends us this information does not indicate the kind of institution in which the tragedy occurred, but asks us to make it known, "as a warning to nurses and others." It is impossible to conceive such a ghastly failure to provide against an obvious contingency in any well-ordered establishment.

## STOKE-ON-TRENT GAS UNDERTAKING.

### The Annual Accounts.

The accounts of the Gas Department of the County Borough of Stoke-on-Trent, for the year ended March 31 last have been issued. It will be remembered that the undertaking now embraces the Burslem, Stoke, Fenton, and Longton works; but in the accounts the results for each are set out separately. The principal figures are as follows: Burslem—Gas made, 235,465,000 cubic feet; per ton of coal carbonized, 12,135 feet; increased quantity of gas sold over previous year, 13·16 per cent.; gas unaccounted for, 6·72 per cent.; gross profit, £10,510; and net profit, £5036. Stoke—Gas made, 150,458,000 cubic feet; per ton of coal carbonized, 12,434 feet; increased quantity of gas sold, 4·71 per cent.; gas unaccounted for, 6·34 per cent.; gross profit, £4060; and interest, &c., charges amounted to £4184. Fenton—Gas made, 109,996,000 cubic feet; per ton of coal carbonized, 12,228 feet; increased quantity of gas sold, 9·07 per cent.; gas unaccounted for, 8·68 per cent.; gross profit, £3512; and net profit, £547. Longton—Gas made, 166,693,000 cubic feet (including 11,082,000 cubic feet of water gas); per ton of coal carbonized, 12,953 feet; increased quantity of gas sold, 7·11 per cent.; gas unaccounted for, 4·89 per cent.; gross profit, £10,043; and net profit, £3073.

## GAS FOR DOMESTIC HOT WATER SUPPLY.

In the "JOURNAL" last week (p. 584) reference was made to an article that had appeared in the Engineering Supplement of "The Times" by Mr. R. Herzfeld. The article, in our opinion, did not go far enough, in properly picturing the claim that gas has to-day in being considered an economical agent in furnishing hot water for household purposes. Mr. Frederick Dye has rectified the omission in a letter to our contemporary, of which the following is the main portion.

The chief point that your contributor calls attention to is the fact that cooking by gas is growing in favour—becoming almost universal for summer requirements; and as this leaves the range fire unlighted, we are deprived of the great convenience of having hot water in bulk for warm baths and pantry use. It is to meet this want that the co-operative principle is suggested, while no mention is made of that very practical means of heating water, the gas-boiler. This kind of boiler is not in its experimental stage, but is an established useful and economical heater, of which thousands are doing excellent service; and there is every promise—certainty, in fact—of it becoming the companion of the gas-cooker. It is only a question of becoming known; but already its use is increasing at about the same rate as that of the gas-cooker in its early days.

With gas at (say) 3s. per 1000 cubic feet, the gas-boiler can (or should) heat some 20 gallons of water from cold to bath temperature (100° Fahr.) for ¾d. in summer, and 1d. in winter—this being the cost of a single bath. Baths successive to the first cost a little less. Water for scullery or pantry use, at 150° Fahr., costs 1d. to 1½d. for 10 gallons. These are established figures; so that for economically heating water the gas-boiler may be used without fear of excessive gas consumption or disappointment. But it must be seen that losses or unnecessary consumption do not occur between the times of heating the water; for should this happen condemnation of the boiler may follow.

Although water can be heated by gas cheaply, it takes but little waste to make this service dear; and to prevent waste, and ensure economy, it is recognized that every gas-boiler used for domestic hot water supply should have a "thermostat." This is a device which causes the gas consumption to be controlled by the heat of the water, automatically. It has been thought, and sometimes claimed, that a gas-boiler is suited for emergency uses only—to heat water when required, the gas then to be turned out; but this would never admit of the gas-boiler being a practical companion to the gas-cooker. A gas-boiler must be capable of all-day service economically (and all night if desired); and while this must be considered as impossible with hand control, it is not only possible, but positive, by the aid of a reliable thermostat.

Unfortunately, the several types of thermostat which exist vary (to say the least) in efficacy. Some work doubtfully in governing the gas supply; but where serious failure is experienced is when the controlling device admits of wasteful gas consumption during the many hours in a day when the boiler is idle—the slack hours when the demand for hot water ceases. Unless the thermostat is reliable in this, there may be a greater, or as great a, gas consumption during the slack hours than during the busy ones. (In many houses the busy hours, for hot water, are four, the slack hours ten, per day.)

A good thermostat will shut off the gas promptly when the water reaches the temperature the device is set to operate at, and it will immediately turn up the gas when hot water is drawn and cold water flows in to the apparatus. When the water is heated, the shut-down consumption should be as low as 2½ to 5 cubic feet of gas per hour; this consumption serving to keep the heated water hot—to prevent it cooling—so that there is hot water at demand at any hour all day, and, as stated, all night and very early morning, if desired.

The very low gas consumption obtained with a reliable thermostat, when it is shut down—2½ to 5 cubic feet per hour—costs about ¾d. to 1½d. per day (for the whole of the slack hours); so that the actual total cost of all-day duty of an efficient gas-boiler with an efficient thermostat is that of heating the bath water and the pantry water at the price already given, *plus* about 1d. per day for keeping the water hot between the times of its being heated and being drawn.

The foregoing is practical, actual, and should be guaranteed; but much depends on the thermostat.

"Coalexld" is being used at some half-dozen of the stands in the Bakers' Exhibition at the Agricultural Hall, Islington.

## HARROW AND STANMORE GAS COMPANY.

### Adoption of Co-Partnership.

The Half-Yearly Meeting of this Company was held on Monday last week, at the Holborn Restaurant—Mr. ALFRED H. BAYNES, J.P., in the chair.

The SECRETARY (Mr. J. L. Chapman) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN remarked that the progress which he anticipated when he spoke at the last meeting was, he thought, abundantly evident in the report and balance-sheet for the half year just closed. Gas companies generally had had a good time lately, with increases in the demand for gas and higher prices for all residuals. He was glad to say that their own undertaking had not come behind—showing, as it did, satisfactory results in all departments. The gas-rental for the half year to June 30 amounted to £18,962, which was an increase over the corresponding period of the previous year of £1730, notwithstanding a reduction in price of 2d. per 1000 cubic feet during the six months. The sale of gas had remarkably increased; and this was greatly due to the use of cooking-stoves, which had now been brought to a high state of perfection, whereby the output of gas was often more during daylight hours than at night-time. The quantity of gas sold during the half year was 114,935,000 cubic feet, which was an increase over the same period of 1910 of 15,388,000 cubic feet, or 15·45 per cent. This condition of affairs was, he was glad to say, being maintained, and bid fair to continue. There was no doubt that, whereas in the Company's early days the increases were very small, it had now become one of the most important Suburban Gas Companies near London; and railway stations were still being opened, and new districts developed. In the period under review, fittings, meter, and stove rentals had increased by £249. The Directors had thought it wise to fully write-down the value of meters, stoves, and fittings. A considerable proportion of the increase in gas consumption was certainly due to the hire of cooking-stoves, in which a big amount of capital was invested. The increase in the receipts from residuals was £1017, as compared with the corresponding half of the preceding year; and it was interesting to note that, comparing these extra receipts for residuals with the extra cost of coal, oil, and coke for the carburetted water gas, there was a decreased cost of materials for the production of the increased quantity of gas sold of £186. The increases in the value of residuals separately were: Coke and breeze, £623; tar, £231; sulphate of ammonia, £163 Considerable lengths of mains had been altered and relaid, which supplied the reason for the larger amount spent on main repairs. It might here be noticed that the "rents receivable" had disappeared from the balance-sheet. There were five cottages on the land lately purchased. The new railway passed close to them; and the only way into the main road was over the railway. Therefore the Directors thought it better to close the cottages, rather than run the chances of an accident. They would soon have to be removed, however, to make room for new works. The foreman's cottage had been pulled down, and the value taken off the capital account. Referring to the capital account, he might say that during the past few years land had been purchased, for which a large price had to be given; and the new gasholder and tank had cost a big sum. The new railway approach, which was 770 yards in length, and carried some distance on a high bank, was somewhat costly; and a new well had also been sunk. The Directors considered that they would not for some time have a specially large expenditure; and they were looking forward to economies so that the cost per ton of coal of capital expenditure would soon be reduced. For the present half year this was considerably lower than in the previous period. The Directors felt that to the staff and workmen of the Company there was due a large meed of praise for the present efficiency and increase of the business; and they proposed to show their appreciation by recommending to the proprietors that they be admitted to become co-partners in the concern under the scheme introduced by the late Sir George Livesey, by which, through a bonus upon their ordinary salaries and wages, they would be made shareholders. All the regular staff, with the exception of the Engineer and Secretary, would be included in the benefits. It was proposed to give ½ per cent. bonus for every 1d. reduction in the price of gas below the standard price of 4s. The price being now 3s. 4d. per 1000 cubic feet, the bonus for the present year would be at the rate of 4 per cent. A resolution to agree to this would be presented to the shareholders before the meeting closed. In the matter of expenditure, an additional 910 tons of coal had been carbonized during the half year; and the cost was more by £805 than in the corresponding period. The total receipts for the six months came to £25,545, which was an increase of £2912 over the corresponding period; while the total expenditure was £18,476, or £2823 more. The total profits were £7069, or an increase of £88 over the previous year. Debenture stock and loan interest required £934, and the dividends recommended would absorb £5610, leaving a balance of £525. He moved the adoption of the report and accounts.

Mr. SAMUEL CUTLER seconded the resolution; and it was at once carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. CUTLER, dividends were declared for the half year at the rates per annum of 10½ per cent. on the original "A" capital, £7 7s. per cent. on the additional "C" capital, and 7 per cent. on the additional "B" capital and guaranteed shares—all less income-tax.

Mr. F. R. SMITH then moved—"That this meeting, having heard the statement of the Chairman, expresses its hearty approval of the scheme of profit-sharing proposed to be adopted, and wishes it great success." He said it afforded him much pleasure to do so, because he believed it was a step altogether in the right direction. Many labour difficulties had lately arisen all over the country; and it seemed to him that the true solution was to make the employees partners in the concern for which they worked. He remembered Mr. Chapman once saying, at the time when the question of amalgamations was in the air, that if anybody wished to absorb this undertaking, he would have to consider, not only the shareholders, but the members of the staff and workmen. This was what Mr. Chapman always did. He (the speaker) did not think the Company would lose anything by adopting the co-partnership system, because every man would feel himself interested.

Mr. F. PILLEY, who seconded, also expressed the opinion that the Directors were doing absolutely the right thing. Co-partnership made the men much more contented, and induced them to put their whole heart and soul into the work they had to do.

The resolution was agreed to.

Mr. A. F. PHILLIPS moved a vote of thanks to Mr. Chapman and the staff who had worked so loyally under him. He remarked that owing to the large increase in the business which was continually taking place, Mr. Chapman's hands were always full of extensions; and at the present time he was occupied in building an additional retort-house. The Directors were fully aware that these extensions kept increasing the capital, and they were always impressing upon Mr. Chapman the fact that they considered the capital too large, and were exceedingly anxious to reduce it. He was certain Mr. Chapman was using his best endeavours to this end. They had had to carry out works which, though they would be of great benefit to the Company, had been exceedingly costly. The acquisition of the land to connect the works with the railway was the cause of considerable outlay of capital. This had been supplemented by the cost of the railway siding; then by the large gasholder; and now there was the erection of the new retort-house. But he did believe that when these works were completed, if the consumption of gas continued to develop in the future as it had done in the past, the shareholders would see the relation between the capital and the coal carbonized materially changed. As Mr. Smith had pointed out, Mr. Chapman was always considering what he could do to benefit the staff and men working under him; and he no doubt obtained from them thoroughly loyal and faithful service.

Mr. J. CASH, in seconding, said he thought Mr. Chapman's returns for the past half year were the best he had seen; and then, of course, the frequent extensions threw a great deal of responsibility upon his shoulders. The Engineer and all the staff must have worked hard to attain the excellent results now placed before the shareholders.

The resolution having been heartily agreed to,

Mr. CHAPMAN returned thanks for himself and the staff, and said it had always been strongly in his mind—but especially of later days—that the consumer was the man to be satisfied. If the consumer was pleased, the shareholder must be benefited. He had trained his staff on these lines. There had been a great vindication of the action of the Board in going forward with the Standard Burner Bill. Since the Act was passed, the price of gas had been reduced, and it seemed to have balanced the price of coal in regard to cooking, because the output of gas cooking-stoves had been very great. To his mind, it was wonderful that reasonable men—as many of the councillors were—should have taken such steps as had been taken to prevent the consumers from getting the very best results the Company could give them. This seemed to be the only object the Councils could have secured if they had succeeded in getting the Bill thrown out. The consumer now saw he was getting the benefit of the Act.

The proceedings concluded with a vote of thanks to the Chairman and Directors, which was accorded on the proposition of Mr. W. RICHARDS, seconded by Mr. F. J. BANCROFT.

## SHREWSBURY GAS COMPANY.

The Annual General Meeting of this Company was held on the 1st inst.—Mr. T. P. POOLE (the Chairman) presiding.

In the report presented by the Directors it was stated that the profit on the working in the year to June 30 amounted to £8831. An interim dividend of 2½ per cent. was paid in March last, and £1000 had been set aside to meet a deficiency in the reserve fund caused by the great depreciation of Consols. The Directors recommended that a final dividend of 3 per cent. (making 5½ per cent. for the year) should be declared, leaving a balance of £2207. The reserve fund amounted to £11,578, and was fully invested. There had been an increase of more than 5 million cubic feet in the consumption of gas during the year; and the Directors expressed their pleasure at having been able to announce a reduction of 1d. per 1000 cubic feet, taking effect from June 30. The number of stoves on hire at that date was 3252; and there were 3870 prepayment meters in use. Under the supervision of Mr. William Belton, the Engineer and Secretary, 18,407 tons of coal and 486 tons of cannel were carbonized during the year; the make of gas being 207,569,000 cubic feet, of which 183,500,000 cubic feet were sold by meter and 6,871,000 cubic feet for public lighting.

The CHAIRMAN, in moving the adoption of the report, said it was one of the best the Directors had had the pleasure of presenting; and the Company were to be congratulated upon the evidences of vitality and prosperity which it revealed. Naturally the first point of interest would be the profit on the year's working, which amounted to the satisfactory sum of £8831 odd; and, after paying a full dividend of 5½ per cent. for the year, as well as interest on the mortgage bonds, they were able to set aside £1000 to meet the deplorable and continued depreciation in the value of Consols, in which most of their reserve fund was invested. The balance on the profit and loss account to carry forward was £2207, or about £346 less than last year. The Directors had been pleased to be able to reduce the price of gas as from June 30 last. He hoped and thought it was now beginning to be recognized that gas vendors of to-day had no monopoly of the supply of light, and therefore, in their own interests, had to consider the best interests of their customers. Thus nearly three-fourths of the benefit went to the consumer, and a little more than one-fourth only to the shareholder. Other important interests of the consumer were concerned with the purity and illuminating power of the gas; and here he might say that no one need suppose that they were going to damage the Company's interests by offering to the consumer that which would tend to diminish their sales of gas instead of increasing them. The quantity of gas sold during the year had been upwards of 5 million cubic feet in excess of the previous year; for which they had received £700 more; and residual products had yielded £795 more. Against these higher receipts, they must put an extra cost of £866 for

coal, a further £73 for rates and taxes, and other small increases, due principally to the larger volume of business done, for some of which the slot-meter system was accountable. To turn for a moment to other matters, they had not, fortunately, been seriously inconvenienced by the recent deplorable strikes. But in every branch of industry the labour troubles caused anxiety as to the future; and it was to be hoped that some truly statesmanlike and satisfactory plan would be devised to render such frequent and disastrous upheavals impossible. The principle of State insurance had the Directors' approval. In conclusion, he was glad to say they had been able to make more favourable coal contracts for the current year; that customers were increasing—more stoves and slot-meters going into use; and that the present outlook was such that they confidently expected to meet the shareholders next year with a report as satisfactory as the one now submitted. In the meantime, all their property was being kept in good and efficient condition, and some extension of mains was being made and contemplated, which they expected would bring them a further increased consumption.

Mr. G. Evans seconded the motion; and it was carried.

The dividend recommended having been declared, the retiring Directors and Auditor were re-elected.

The Chairman, in acknowledging a vote of thanks accorded to himself and his colleagues on the Board, said their thanks were due in a special manner to Mr. Belton, for his able management of the affairs of the Company. The fact that the balance-sheet was so satisfactory was the result to a great extent of the indefatigable and watchful care which he was ever ready to bestow in their interests; and he (the Chairman) congratulated him on being able to produce such a report. He proposed a vote of thanks to Mr. Belton, and coupled with it the staff, who were, he observed, thoroughly loyal to the Company.

The motion having been carried,

Mr. Belton, in acknowledgment, said the whole staff, as well as he himself, were anxious to do whatever they could to promote the interests of the Company. Referring to the coal strike which appeared to be looming just then, he remarked that he had in stock sufficient coal to last longer than such a strike was likely to do.

## ILFORD GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Company was held last Tuesday—Mr. William Ashmole presiding.

The Chairman, in the course of his address, said the half year ending June had furnished them with a balance-sheet which was highly satisfactory; the results of the working further proving the sound condition and prosperous nature of the undertaking. Notwithstanding the slow growth of Ilford compared with what had been experienced in past years, the sale of gas continued to show considerable increase. The quantity sold during the past half year was 193,567,000 cubic feet, as against 178,765,000 cubic feet for the corresponding half of 1910. This increase represented 14,802,000 cubic feet, or 8·28 per cent.; and when they considered that 1 per cent. increase on the present gas output represented double the amount of gas when compared with the output of eight or nine years ago (when 18, 19, and 20 per cent. increases were common), they would readily see that the Company were progressing at a pace quite consistent with the general conditions of things at the present day, and which compared very favourably with past years. The total number of consumers on the Company's books at the end of the half year was 13,793, being an increase of 195 since December. The increase in the number of consumers did not altogether account for the increase in the gas consumption. The fact was that the consumption per consumer was greater, which was brought about by the larger use of gas apparatus for lighting, heating, cooking, and other domestic purposes. Gas-fires, owing to present-day high efficiencies and cheapness, had become almost indispensable—so much so that in many instances where a gas-fire had been fitted for a consumer it had proved so useful that other fires had been fitted in the same house. Gas-irons, gas-coppers, water-heaters, geysers, &c., had also now reached a high state of efficiency; and the Company gave the consumers full inducement to have these special appliances fitted, having found from general experience that when once a geyser, copper, or other apparatus had been fitted, it was rarely discarded—proving that gas was becoming more and more a household necessity. The revenue received by the sale of gas was £27,385, as against £25,952, showing an increase of £1433. Considering that the gas was reduced in price at the end of last year, this increase was one on which they might congratulate themselves. Rental of meters, stoves, and fittings had brought in an increased revenue of £195; and residual products showed an increase of £552. These three items make a total increase in revenue of £2180. On the debit side of the revenue account, the items under manufacture of gas, distribution, &c., also compared very favourably with the corresponding half-year's accounts. The total expenditure under revenue account amounted to £28,169. Last year this figure was £27,941, the increase in expenditure amounting to £228. These figures proved that the work during the past half year had been done in an efficient and proper manner. Some of the plant was large enough to undertake double the amount of work it was doing at the present time. This was very necessary in a district such as this, where building extensions might come along rapidly at any moment. They were ready to meet a larger output at very little extra expense. It was proposed to pay the full statutory dividend of 7½ per cent. per annum on the "A" and "C" stocks, and 6 per cent. per annum on the "B" stock, less income-tax. These increased dividends were due to the fact that the gas was reduced by 1d. per 1000 feet last December. A further reduction of 1d. would take place from Christmas quarter next. This would bring the price down to 2s. 9d. per 1000 cubic feet; and the Board were hopeful that further reductions might be possible at some future time. The stockholders had read, no doubt with great regret, that Mr. H. W. Ashmole, who had been seriously unwell for about a year, had been compelled with great reluctance to retire from the office of Secretary to the Company, acting under the advice of his medical man. Mr. Gerald H. S. Iorns, who had been appointed Secretary in the place of Mr. Ashmole, had been in the service of the Company for the last twelve years. He had lately held the position of Chief Clerk and Accountant; and the Directors had made the appointment because they recognized the care and ability with which he had always carried out his duties.

The report and accounts were adopted, and the dividends declared. The meeting then proceeded to grant an annuity to Mr. Ashmole on his retirement from the office of Secretary, and to fix the remuneration of Mr. Iorns as Secretary.

Votes of thanks to the Directors, the Engineer and Manager (Mr. W. B. Farquhar), officers, staff, and workmen, and the Chairman for presiding, brought the proceedings to a close.

## ENFIELD GAS COMPANY.

The Half-Yearly General Meeting of the Company was held recently, under the presidency of Colonel Sir A. P. Somerset, K.C.B.

The Chairman, in moving the adoption of the report and balance-sheet, said the Bill introduced by the Company into Parliament in the present session had become law. Its progress for the greater part of its course through the Committees was opposed by the Middlesex County Council, whose aggressive terms the Company could not agree to. The result justified this refusal, as the House of Lords Committee and the Court of Referees, after hearing Counsel and witnesses for both sides, upheld the position taken up by the Company, so that subsequently the Council withdrew their opposition, and the Bill came before the Committee of the Second House unopposed. The Directors were satisfied that it was a very useful and valuable measure. He also referred to the constant growth of the business; and in mentioning the result of the issue of additional capital last April, he said that it gave solid proof of the increasing value the investing public set upon the Company's stocks, as well as upon gas stocks in general.

Mr. A. L. Ford seconded the motion, and enlarged upon the various details of the operations and the items of the balance-sheet. He stated that the total number of consumers was 10,095, and of the users of gas-cookers 6972—showing a growth during the past year of 475 consumers and of 344 users of gas-cookers. The gas made had averaged 11,617 cubic feet per ton of coal; the candle power being 15½ candles, as tested under the old conditions. Satisfactory progress had been effected in the unaccounted-for gas, as there had been a decrease, not only in the percentage, but in the actual quantity. The percentage had fallen from 4·28 to 3·04, and the quantity from 4,769,000 feet to 3,647,000 feet. The price of gas was 2d. per 1000 cubic feet less throughout the half year than in the corresponding period of 1910. The increase of 9,794,000 feet (or some 9¼ per cent) in the quantity of gas sold, had made up for the reduction, and had added £606 to the rental. Meters, cookers, fires, and fittings had brought in an additional £346; while the return from residuals had improved by £1000. On the expenditure side, it would be seen that coal had cost more by £876, due entirely to the extra tonnage carbonized. Substantial additions had been made to the special purposes fund and to the reserve fund—£750 in the first case, and £950 in the latter—and a small remainder after providing for the dividends recommended, would bring the unappropriated profit up to £11,461.

Dividends at the rate of 5 per cent. per annum on the consolidated preference stock and at the rate of 5½ per cent. per annum on the consolidated ordinary stock were declared; and the meeting closed with votes of thanks to the Chairman and Directors and to the General Manager and staff, which were respectively replied to by Sir Alfred Somerset and Mr. C. W. Offord.

## MUNICIPAL WORKERS AND NON-UNIONISTS.

### A Threatening Circular.

The officials of the Municipal Employees' Association are actively engaged in an effort to convert those who are at present outside the ranks of that organization. The circular sent out by them to non-unionists in the employ of corporations, however, is something in the nature of a threat, as may be gathered from the following extract: "This is a warning. The sands are running out; and our patience is exhausted. The time has come when we neither can nor will tolerate your apathy and indifference. After this, if you still choose to go your own way, careless of the well-being of yourselves and your fellows, then on your own head must rest the consequences of whatever action we, as Trade Unionists, may be compelled to take. One thing is clear, we must cease to regard you as fit fellow-workers, and must act accordingly." As reported in last week's "Journal," a meeting of representatives of branches of the Municipal Employees' Association, held in Manchester, decided not to put into force a resolution previously passed to cease to work with non-unionists, but to endeavour to secure redress of alleged grievances by "other means."

Mr. R. Davies, General Secretary of the Municipal Employees' Association, replying to criticisms passed upon that combination by other Trade Unions, denies that it has endeavoured to recruit its membership from other organized bodies of workers. "This," he adds, "has been attempted at our expense by the very anxious Unions that have accused us." The Municipal Employees' Association, he says, is a properly registered and *bona-fide* Trade Union, and, embracing as it does all sections of municipal workers, has secured benefits which membership with other organizations could not have obtained. Alderman Jackson, General Secretary of the Amalgamated Association of Tramway and Vehicle Workers, denies that the members of his Union agreed with the Municipal Employees' Association not to work with non-unionists after Aug. 31. "Further, I wish it to be known," he adds, "that we have refused to enter into any arrangements with the Municipal Employees' Association, owing to the fact that they are not recognized as a Trade Union by the Trade Union Joint Committee, nor by other labour bodies. Of course, it is easy to see why the Municipal Employees' Association desire to drag us into the matter. We can deal the biggest blow at the public, and our support would very largely strengthen their position."

## THE GAS PUBLICITY SCHEME.

### Stockport Town Council's Decision.

At last Wednesday's meeting of the Stockport Town Council, reference was made to the Publicity Scheme of the Institution of Gas Engineers, and the recommendation of the Gas Committee that Stockport should contribute to the fund on the basis of 2s. 6d. per million cubic feet of gas made, subject to certain conditions.

When the Gas Committee last met, Mr. S. Meunier, the Engineer, presented further particulars as to the scheme, and reported that the Manchester and Salford Corporations had decided to contribute on the 2s. 6d. basis. After hearing the report of the Engineer, the Committee decided that Stockport should contribute on the same basis, subject to satisfactory representation on the Executive Committee, and to the whole question being reconsidered at the end of three years.

On the proceedings of the Gas Committee containing this minute being brought before the Council for confirmation, Alderman Allcock described the scheme as a new method of bolstering up private gas undertakings. The Stockport Gas Committee, he said, had only a limited area in which they could supply gas; and it was not likely the readers of such journals as the "Gentlewoman," the "Sketch," "Black and White," the "Woman at Home," the "Strand Magazine," and "Fashions for All" would leave their palatial residences and go to live in Stockport to participate in the special benefits of Stockport gas. He considered this an unnecessary expenditure.

Alderman Fernley, the Chairman of the Gas Committee, replying, said he did not know before that Alderman Allcock was a humorist. The advertising of gas in the periodicals mentioned was not confined to Stockport gas—it was a systematic system of "advertising gas" for cooking and other purposes. Everyone knew the severe competition which electricity was causing to gas; and it had been felt in various parts of the country that it was necessary for gas undertakings to protect themselves against growing competition. The only way to do so was to advertise the advantages of gas over electricity in many ways.

Mr. Noden and others supported the Committee's proposal; and the minute was ultimately confirmed.

## LONDON'S WATER AND LIGHT SUPPLY.

On Monday of last week, the "Evening Standard" published the following remarks on the subject of police precautions to ensure the maintenance, in troublous times, of the water and light supply of London.

Arising out of the recent labour upheaval in the Metropolis, an important step has been taken to safeguard the public interests in the matter of water, gas, electrical supplies, and food stuffs. The enrolment of a large body of special constables necessitated the formation of a headquarters staff, the members of which were engaged in various forms of organizing work when the order was given for the disbanding of the men. It was thought desirable that some of the inquiries on which the staff were employed should be continued, in order that, in the event of another emergency arising, the department might have information which it was essential to possess.

Four members of the headquarter staff were accordingly retained; and they have been visiting various parts of London to note the location of electric power houses, coal depôts, and water and food storage. The utmost importance is attached to safeguarding the lighting of the city, as with the streets in darkness millions of pounds worth of property would be at stake. Emphasis is laid upon the fact that it is not a question of mapping out London for military purposes; the authorities are merely collecting information in order that the lighting of the streets may be ensured, and that the supplies of water and food may receive adequate protection in the event of troublous times occurring.

## GAS POISONING CASE AT MOSSLEY.

By a leakage of gas from a pipe in the cellar of the house they occupy in Berry Street, Mossley, a family named Redford have lost one member by gas poisoning, and two others nearly shared the same fate. Early in the morning, neighbours noticed there was a strong smell of gas issuing from the dwelling-place of the Redfords; and no answer being obtainable to repeated knockings, the door was forced open. Mr. John Redford, the head of the house, was discovered lying behind the kitchen door in an unconscious condition; while Mrs. Redford and her daughter Clara were found in bed, also in an unconscious condition. The place was full of gas; and it was deemed advisable by the doctors called in, after artificial respiration had been applied, to have the sufferers removed to the Ashton-under-Lyne Infirmary. Mrs. Redford did not rally, and died the next morning; but the other two patients are reported to be recovering satisfactorily. The Redfords had only returned to their home the previous night, on the conclusion of their holidays; and an examination of the place after the tragedy showed there was a fracture in a branch-pipe close to the meter in the cellar, from which gas had escaped in considerable volume.

At the inquest, John Redford, the husband of the deceased, said he was a meter inspector. He described how, on awakening in the morning, he found his wife gasping for breath; and on going for his daughter, who was in an adjoining room, he could not rouse her. The strange thing about it was that he could not smell gas, though he felt numb. He managed to get downstairs, but did not remember anything more until he found himself in the infirmary. In reply to the Coroner, witness said he knew the pipe in the cellar was defective, and had used white lead to stop the escape of gas.

Mr. James Taylor, Manager of the Mossley Corporation Gas-Works, said that, on going into the cellar of the house occupied by the Redfords, he found a branch-pipe, which at one time had been used to supply a gas-cooker, was completely severed, and was lying on the meter. The branch joint was a perfectly good one; but a portion of the pipe had been slightly weakened by the process of making the joint. The back of the disused branch-pipe—about 3 feet—was quite unsupported; and in his opinion the weight of it had broken the pipe near the joint.

The House Surgeon at the infirmary having stated that death was due to coal-gas poisoning, the Jury returned a verdict of "Death from misadventure."

## NOTES FROM SCOTLAND.

### From Our Own Correspondent.

*Saturday.*

We have this week celebrated the Jubilee of the North British Association of Gas Managers—that is, the Association and its friends have celebrated the entry into the jubilee year. Had it not been for the aid which was derived from the birthday feeling which was thrown into the proceedings, it is to be feared that the meeting would have been one of those which would not have been remembered. The bill of fare presented was very slender, for which the Committee are not on any account, nor to any degree, to be found fault with. They are to be sympathized with; and, indeed, they court the sympathy which they are now receiving, because in their annual report they bewail the apathy of the members in the matter of contributing papers at the meeting. They deserve double commiseration, for if they had been able to fulfil their intention to inaugurate the William Young Memorial Lectureship, there would have been a glory about the meeting which few of the past gatherings have possessed. But this cup was dashed from their lips at a time when it was too late to make substitute arrangements. Those who make it their boast that they live the simple life, which surely must be in hibernation, because we never meet with any specimens of simple livers walking abroad, make their hearers almost hold their breath at the wondrous tales of how to live upon next to nothing. In this matter everything depends upon the spirit in which the step is taken. So it was on Thursday, the meeting were in jubilee, not to say jubilant, spirit; and they made a very presentable dish indeed with the small fish which they had caught. Than Mr. G. Keillor's presidential address it would be difficult to imagine anything better suited to the occasion. He not only gave abundance of material for consideration; but the form of giving it was such as to make the address positively interesting. The technical matter discussed at the meeting was not striking, neither was much time taken up with it. There was a very fair discussion upon the "Need of Publicity," which was appropriate before an Association who do not seem to be very enthusiastic over the proposals of the Institution of Gas Engineers. The need for publicity is admitted: but the payment for it is not. However, the publicity given to the discussion may be the means of opening the mind's-eyes of some who are at present hesitating to support the movement. It is to be hoped so. The Association are to be congratulated upon the election of Mr. S. Milne, of Aberdeen, to be President. Mr. Milne is in charge of a works the capital account of which has been written down so severely that the burden is much lighter than it is in any of the other large gas undertakings in Scotland. Then, under his fostering management, the Corporation have this week resolved to issue gas cookers and fires free of hire. This includes fixing. It is a boon which the community of Aberdeen ought to appreciate. The step is one which could not be taken with the same fulness in almost any other large city, because of the capital indebtedness. Taken in Aberdeen, it will be watched with interest. It is estimated, I understand, that the effect of the free use of appliances will be to lead to an increased output of gas in the course of three years to the amount of 120 million cubic feet. The fortunes of this great venture will give zest to the next meeting of the North British Association, which is to be held in Mr. Milne's own city.

The Gas Committee of the Glasgow Town Council on Thursday came forward with a request for renewed powers in connection with their proposal that a commercial superintendent should be appointed. The recommendation to this effect was made by the Committee on July 28, but was re-committed by the Council on Aug. 10. Mr. P. G. Stewart, at whose instance the subject was re-committed, on Thursday moved that it be again sent back to the Committee. Bailie Paxton, the Convener of the Committee, explained that they had, in addition to the gas-works, huge buildings which were let to outsiders, and he was of opinion that they should manage all these matters themselves. All they asked for at present was power to inquire. They would come back to the Council with a report; and then the subject could be discussed. The whole matter was instituted at the instance of the Lord Provost, who spoke to him six months ago, and urged him to do something, believing that the salary to be paid would be repaid ten times over in one year. Mr. Stewart, in view of this explanation, allowed the subject to go again before the Committee.

The Peterhead Town Council on Monday again had the subject of over-valuations of gas-works stock brought before them by Mr. Gordon. The over-valuations had been rectified, and it was believed that no loss had been sustained by the Corporation in consequence of them. Mr. Gordon wished to have the subject discussed; but the attitude of the Gas Committee was that they should wait till a communication upon the subject be received from the Scotch Office. Provost Leach supported this view, and Mr. Gordon was prevented from going into the matter in the meantime, but was told that when they heard from the Scotch Office he would be allowed to discuss it at will.

The Dumfries Town Council on Thursday considered the report of the Gas Manager, Mr. S. Dickie, for the past year—a summary of which was given in these "Notes" a week or two ago—and, on the recommendation of the Gas Committee, the Council unanimously agreed to reduce the prices of gas to all consumers by 2d. per 1000 cubic feet, making the charges: To ordinary consumers, 2s. 7d.; to prepayment meter consumers, 3s. 1d.; for public lighting, 2s. 7d.; and for power purposes, 2s. 4d. In moving adoption of the recommendations of the Committee, Judge Thomson, the Convener, said that the Gas Manager's report was the best they had had for many years.

A year ago, the Town Council of Carnoustie acquired the undertaking of the Carnoustie Gaslight Company. The Company went into liquidation, and the Liquidator—Mr. David Kidd—has issued a circular, in which he states that, after great delay, the Inland Revenue Officials have at last intimated that they have no claim against the Company for increment value duty under the Finance (1909-10) Act, 1910, in respect of the sale of the Company's property. The balance of money in hand, amounting to £1185, can now therefore be divided. The Directors recommend the division of the sum as follows: In payment of a final dividend of 1s. 6d. per share to stockholders, £300; remuneration to the Liquidator, and compensation to him for loss of office as Clerk and Treasurer to the Company, £400; remuneration to the Directors for loss of office, £360; to the auditors for loss of office, £40; and to the employees at the gas-works, £80. There remains a sum of over £5 to meet the cost of final winding-up. The shares in the Company numbered 4000, and were of the amount of £1 10s. each. The return to shareholders has been at the rate of £4 1s. 6d. per share.

The Fraserburgh Town Council on Thursday agreed to borrow £30,000, to pay the price fixed by arbitration of the undertaking of the Fraserburgh Gas Company. The price fixed by the Oversman—Mr. A. Yuill, of Dundee—was £26,960. In addition to this, the Council have to provide for interest at 4 per cent. from May 1 to Aug. 31, £372; for the expenses of the arbitration, estimated at £820; the expenses of conveyance, inclusive of stamp duty, £500; the expenses of the loan, £350; stocks, &c. £997. They have succeeded in borrowing the amount they sought at a rate of £3 12s. 6d. per cent.; the principal to be repaid in eighty half-yearly instalments of £375 each.

The Dysart Gas Company, Limited, have reduced the price of gas from 3s. 11½d. to 3s. 9d. per 1000 cubic feet.

It was reported to the Dunoon Town Council last week that there was a balance of £1719 in the net revenue account of the Gas Department at the end of the financial year. The total expenditure in the department during the year was £6376, and the total revenue £8095. The quantity of gas made was 39,391,600 cubic feet—an increase over the preceding year of 130,600 cubic feet, and of 1,828,300 cubic feet over the make two years ago. The revenue from gas sold during the past year was £6099.

In the Inverness Town Council on Monday, Treasurer Duncan Macpherson said that they estimated a revenue in the Gas Department of £17,841, and an expenditure of £16,492—leaving a surplus of £1349.

In the Town Council of Ellon on Thursday, the Convener of the Gas Committee reported that a considerable saving had been effected in the manufacture of gas. They had a very satisfactory profit for the past year, which would enable the Council to suspend levying the contingent guarantee rate, which last year was fixed at ¼d. per £1, and is payable by occupiers only.

The Dundee Gas Commissioners have engaged the services of Miss E. E. Mitchell, of Edinburgh (late Domestic Economy Instructress to the London County Council, Education Department), as Lady Cookery Demonstrator, to advise their consumers as to the best and most economical method of using gas appliances.

## CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 700.]

LIVERPOOL, *Sept.* 9.

**Sulphate of Ammonia.**

In the absence of support from either consumers or dealers, the market for sulphate of ammonia has continued to have a drooping tendency throughout the past week. A fair quantity has been offered for sale by manufacturers, which has only found an outlet at a further reduction in price; the nearest values at the close being £13 17s. 6d. per ton f.o.b. Hull, £13 18s. 9d. per ton f.o.b. Liverpool, and £14 per ton f.o.b. Leith. Little activity prevails in the forward position, buyers evidently being inclined to await developments before covering their future requirements. Makers are now quoting £14 5s. per ton f.o.b. at the best ports for October-March or January-June delivery, but there are second-hand sellers at less money.

**Nitrate of Soda.**

The tone of the market remains quiet, but holders are very firm at 9s. 10½d. per cwt. for ordinary, and 10s. 1½d. for refined quality, on spot.

LONDON, *Sept.* 11.

**Tar Products.**

The markets for tar products still remain firm. In pitch, there has been a fair amount of inquiry for this article; and one or two important sales have been made to the Continent. Benzols are steady; and there is a fair amount of inquiry for prompt delivery. In solvent naphtha, business is quiet, but prices continue unchanged. In crude carbolic, there is a certain amount of inquiry for forward, and buyers are prepared to do business in the neighbourhood of 2s. per gallon.

The average values during the week were: Tar, 21s. to 25s. *ex* works. Pitch, London, 40s. 6d. to 41s. 6d.; east coast, 40s. to 41s.; west coast, Manchester, 39s. 6d. to 40s. 6d.; Liverpool, 40s. to 41s., Clyde, 40s. to 41s. Benzol, 90 per cent., naked, London, 8½d. to 8⅝d. f.o.b.; North, 8d. to 8⅛d. f.o.b.; 50-90 per cent., naked, London and North, 7¾d. to 8d. f.o.b. Toluol, casks included, London, 8½d.; North, 7½d. to 8d. Crude naphtha, in bulk, London, 4d. to 4¼d.; North, 3¾d. to 3½d.; solvent naphtha, naked, London, 9¼d. to 9⅜d. f.o.b.; North, 8d. to 8⅛d. f.o.b.; heavy naphtha, naked, London, 10¼d. to 10⅜d. f.o.b.; North, 9d. to 10d. f.o.b. Creosote, in bulk, London, 2⅛d. to 2 9/16d.; North, 2⅛d. to 2¼d. Heavy oils, in bulk, 2¾d. Carbolic acid, casks included, 60 per cent., east coast, 2s. to 2s. 3d.; west coast, 1s. 11d. to 2s. 2d. Naphthalene, £4 10s. to £9 10s. salts; 42s. 6d. to 45s., bags included. Anthracene, "A" quality, 1½d. to 1⅞d. per unit, packages included and delivered.

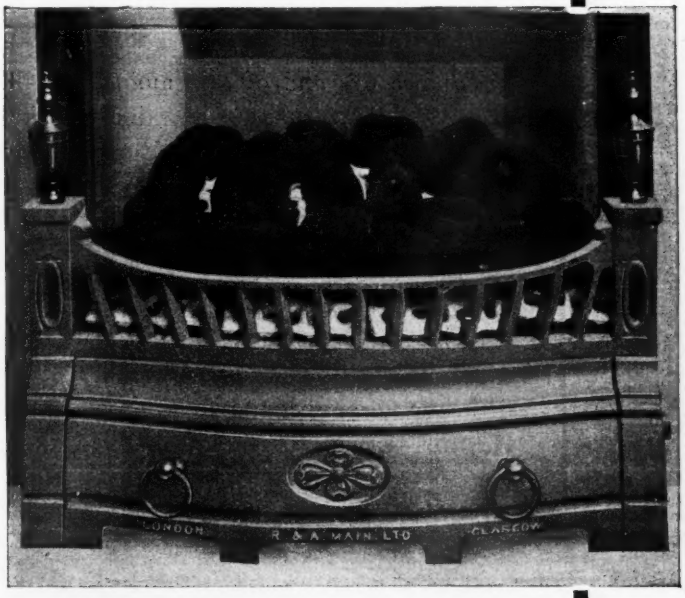
**Sulphate of Ammonia.**

The market for this article has been particularly quiet during the past week, and for prompt delivery prices have declined to the extent


Two years ago we introduced the

**"ST. NICHOLAS"**

Interior Fitting for converting a Coal Fire into a Gas Fire.




It filled a want and met with success. Its success was followed by imitations; the imitations still follow far behind.

It is the best means of utilising coal grates for gas and it is one of the most popular items on hiring lists.

In many styles and sizes.

**R. & A. MAIN, LIMITED,**

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes St., Oxford Circus, W.; 136, Renfield St., GLASGOW; 56, Broad St., BIRMINGHAM; 83, Old Market St., BRISTOL; 13, Whitworth St. West, MANCHESTER; 8, Exchange Place, Donegall St., BELFAST; 333, Queen St., MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY.

of about 2s. 6d. per ton; but for the forward position manufacturers will not quote lower prices, consequently very little business has been possible. To-day, actual Beckton is still quoted £13 15s.; but outside London makes could no doubt be secured at £13 10s. In Hull, the quotation is £14; Liverpool, £14 2s. 6d.; Leith, £14 5s.; and Middlesbrough, £14.

## COAL TRADE REPORTS.

### Northern Coal Trade.

There is now a strong demand for coal, and the shipments would be heavier if the prompt steamers were adequate, but the delay caused by the strikes is not entirely done away with. In the steam coal trade, best Northumbrians are from 11s. per ton f.o.b., second-class steams are 9s. 6d. to 10s., and steam smalls from 5s. to 6s. The output at the collieries is fairly good. In gas coals, the demand is increasing. Durham gas coal is active. For best Durhams, 10s. 9d. per ton f.o.b. is now the current quotation, and 9s. 6d. to 9s. 10½d. for second kinds; while for "Wear specials," up to 11s. 3d. to 11s. 6d. is quoted. There has been a further portion of the contract placed for one of the Italian works, but the amount is not large; and this and some sales of cargoes are at about the current prices. On the whole, gas coals seem a little easier in price; but the home demand is growing satisfactorily. At the same time, there is the dread of a stoppage late in the autumn which may influence prices in a few weeks. Coke is steady; but the output is increasing. Gas coke is about 14s. 6d. to 14s. 9d. per ton f.o.b. in the Tyne or Wear.

### Scotch Coal Trade.

The coal market is fairly active. The demand for ell and splint for shipment is well maintained, with prices firm. Small sorts and washed stuffs are still plentiful. The prices now quoted are: Ell, 9s. 3d. to 10s. 3d. per ton f.o.b. Glasgow; splint, 10s. to 10s. 3d.; steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 327,972 tons—a decrease on the previous week of 10,603 tons, but an increase on the corresponding week of 3616 tons. For the year to date, the total shipments have been 10,831,353 tons—an increase of 82,365 tons.

**Lewes Gas Company.**—It was stated in the report which was adopted at the half-yearly meeting of the Lewes Gas Company that the revenue account for the six months to June 30 showed a profit of £2099. After providing for interest on mortgages, the balance of net revenue was £6392. Dividends for the half year were recommended at the rate of 5 per cent. on the original capital stock, and 3½ per cent. on the additional capital stock. Alderman Miles, who seconded the motion for the adoption of the report, said the people of Lewes received from the Gas Company a very good light for their money—a much better light, it seemed to him, than the rushlight-like electric lamps they saw about the streets of the town at the present time.

## New Offices and Show-Rooms at Cambuslang.

The semi-jubilee of the Cambuslang Gas Company, Limited, was celebrated last Saturday afternoon by the formal opening of a handsome suite of new offices and show-rooms, which has been erected at a cost of £1000. The building, which was erected from plans by Mr. Robert Simpson, the Works Manager and Engineer, comprises an elegantly appointed Board-room overlooking the gas-works, a spacious show-room (in which is displayed a great variety of the latest heating, lighting, and cooking appliances), general offices, and a strong room. Underneath is a commodious store and workshop. Mrs. Rankine, the wife of the Chairman, performed the opening ceremony. In the course of his remarks in addressing the company in the show-room, Mr. Rankine mentioned that the Company was formed 25 years ago. The capital was then £12,000; it was now £36,000. The increase in the make of gas, and the variety of conditions which had been gradually evolved in its use and in the conduct of the business, had necessitated the addition of the new offices and show-rooms. Gas consumers would now have the advantage of seeing and being informed regarding latest novelties in gas lighting, cooking, and heating appliances. He was glad to be in a position to state that the Directors had decided to reduce the price of gas by 2d. per 1000 cubic feet as from next survey, and consumers through slot meters would receive a proportionate deduction, which would be handed to them in cash when the collection was being made.

**Truro Gas Company.**—Presiding at the annual meeting of the Truro Gas Company, Mr. John James referred to the healthy development of the concern. The demand for gas had shown a further improvement of 2¼ million cubic feet, which was very satisfactory, seeing that Truro was not a town which was growing rapidly. With the exception of coke and breeze, they had done better with residual products. The Directors had under consideration the question of the erection of plant for treating the tar, so as to render it more suitable for roads. The report stated that, in order to meet any special expenditure which may arise, it had been decided to open a renewal fund, and a sum of £200 had been put to it out of the year's profit. Some property adjoining the works had been purchased. The balance of profit and loss account amounted to £2158; and the Directors recommended the payment of a dividend of 5 per cent. on the ordinary shares, leaving £251 to be carried forward. The Chairman pointed out that, with gas sold at its present price, the shareholders were entitled, under the sliding scale, to a dividend of 5⅝ per cent. Mr. S. J. Ingram, the Manager, replying to suggestions by shareholders, said some time ago the Directors considered the question of a reduction of price to small consumers, and came to the conclusion that it would be unfair to give an advantage to one class of customers. As to a suggestion that the price of gas for cooking and heating should be reduced, they would rather lower the price generally. It would mean the sacrifice of a large revenue to abolish the rent for cookers.


# Coal

Before the end of this month it will be generally known if the miners of this country determine to take a step which must inevitably prove far-reaching in its consequences. Whether the strike takes place or not it is certain that as the time approaches **Heating by Gas** will be in the minds of all those who wish to provide against paying the high prices now ruling, and which will rule for coal.

This advertisement has for its object the **reminder** that never before have Gas Undertakings had such a unique opportunity to bring forcibly home to their consumers the unrivalled merits of Gasfires—once get them installed and it is certain thousands of

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## Belfast Gas-Works Extensions.

The minutes submitted by the Gas Committee at the last meeting of the Belfast Borough Council, stated that at a special meeting on the 29th ult. it was resolved that the Council be recommended to promote a Bill in the ensuing session of Parliament to authorize the adoption of the old abattoir site for the purposes of the gas-works, and to enable them to acquire certain ground for the purposes of extensions, and to raise the necessary capital. Mr. Squire, who moved the adoption of the minutes, said that, to the surprise of the members of the Gas Committee, having regard to the recent fine weather, there had during the past two months been a very appreciable increase in the manufacture and consumption of gas. In the output for the period from June 29 until July 28, there was an increase of 2,933,000 cubic feet, equal to 2·82 per cent., compared with last year; while the comparative increase for the succeeding month was 3,047,000 cubic feet, or equal to 2·86 per cent. These figures, taken in conjunction with those for the two preceding years, showed that there was a steady increase in the consumption of gas. The minutes were adopted.

## Charge of Murder by Gas.

At the Old Bailey, last Friday, before Mr. Justice Avory, Laura Ann Price (37) pleaded not guilty to an indictment for the wilful murder of Kathleen Price, and to a second count charging her with attempting to commit suicide. Mr. Muir, who prosecuted, said the prisoner was a married woman, and last August was living with her husband and two children at Pinner. The father and one child were absent during the day on the 10th of that month; and when they returned in the early evening, it was found that the tap of the gas-stove in the kitchen had been turned on, and that a large quantity of gas had escaped into the room, where the wife and daughter were lying unconscious. The woman recovered; but the child did not. On a slate in the house was written a note, concluding with the words: "I can struggle no more." Subsequently, the prisoner told the doctor attending her that she did not know why she did it, but that she had put seven pennies in the gas-meter, and thought this would have been enough. When arrested, she exclaimed: "It must have been the heat." For the defence, Dr. Harley testified that he was called in on the day of the tragedy, and came to the conclusion that the woman was not responsible for her actions; and the Medical Officer of Holloway Prison, who had had her under observation, also expressed the opinion that she was probably insane at the time of the crime, but was gradually recovering. The Jury returned a verdict of "Wilful Murder" against the accused, but added that she was insane at the time the deed was committed. Mr. Justice Avory ordered her to remain in custody as a criminal lunatic during his Majesty's pleasure.

Premier Tarless Fuels, Limited, has been registered with a capital of £50,000, in £1 shares (20,000 preference). One of the first Directors is Mr. O. J. Parker.

## Wages at Wallasey.

For some time a Special Committee of the Wallasey Town Council have been engaged in considering recommendations for increasing the wages in certain cases of Corporation workmen and granting bonuses in others; and last Tuesday the proposals came before the Council in committee. Regarding the trading undertakings, it was pointed out that they have afforded substantial aid to the ratepayers during recent years, while concessions have also been made from time to time to consumers and users of the various public services. The Committee consider that labour should now receive some recognition, having regard to the increasing prosperity of the trading undertakings. As an illustration of this, the gas undertaking is quoted; its success being such, it is stated, that a reduction in the price of gas to the consumers of 2d. per 1000 cubic feet next year is seriously contemplated. At the same time, the proposals now made in favour of the whole of the gas employees barely represent one-third of a penny per 1000 cubic feet. The cry that the ratepayers cannot afford the proposed increase is thus declared to be a fallacy. The borough is dependent largely upon its trading undertakings in general, and the ferry and tramway facilities in particular. The surest guarantee of a prosperous Wallasey is the creation and preservation of contentment among its 1525 employees. "We are not justified," the report proceeds, "in keeping rates low at the expense of excessive charges for public service. Neither are we entitled to build up a reputation for low rates and cheap commodities without providing for adequate payment of labour." The bases of the recommendations involved in the report are: All workmen in the Council's regular employ drawing less than 30s. a week to be granted an increase of 1s. per week or ½d. per hour (as the case may require) on the present rate of wages. The minimum rate of wages for all able-bodied workmen in the employ of the Council to be increased to 25s. per week, except road-sweepers, whose wages are to be 22s. 6d. per week. The rate of wages of the gas stokers to be raised 4d. per shift of eight hours. Where it is considered that some recognition should be made of the conduct during the recent labour troubles of those men whose general conditions of employment are deemed satisfactory, a bonus of a week's wages is recommended. All regulations as to payment for overtime, annual holidays, public holidays, sick pay, and merit bonus to remain as at present. On Thursday, the report was unanimously adopted by the Town Council.

The list of machines already supplied or in course of construction affords evidence of the headway that is being made by Messrs. Kirkham, Hulett, and Chandler's new patent "Standard" centrifugal gas-washer. In this connection, it may be mentioned that the manufacture and sale abroad have been taken up by the following firms: Messrs. Bartlett, Hayward, and Co., of Baltimore, for the United States of America; the Compagnie pour la Fabrication des Compteurs, of Paris, for France, Belgium, Italy, and Spain; and Messrs. Zimmermann and Jansen, of Düren (Rheinland), for Germany.


# Strike.

consumers will never again be without. Need we add that our **Stock of A.B.C. Gasfires** which are **interchangeable** throughout has again been prepared for still larger demands than ever, but we urge you to **lay in** your own stocks **at once,** as with all the labour unrest looming both in the **Railway World** and **Coal Fields** you cannot do wrong in **preparing** for the demand whilst supplies can be easily sent.

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***Gas Heating Specialists.***

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## Teignmouth Gas Undertaking.

At a meeting of the Teignmouth Urban District Council last Tuesday, Mr. J. A. Gray, the Gas Manager, stated that there were 51 gas authorities in Devonshire; and of these only six were supplying gas at a less rate than it was proposed to charge at Teignmouth—viz., Plymouth, Devonport, Exeter, Torquay, Torquay (St. Mary Church), and Bideford. He also presented his annual report, which showed that the gross profit for the year amounted to £2170; being a percentage of 14·4 of the capital indebtedness. Of this amount, £1076 was absorbed by the redemption of gas loans. A net profit of £572 remained, and increased the credit balance on the revenue account from £2780 to £3352. During the eight years ended March last, the annual net profit had averaged £680; resulting in financial betterment to a total amount of £4633 for this period. The output of gas for the year under review was 44,799,590 cubic feet, an increase of 2,123,590 cubic feet over the previous year, or 5 per cent. Private consumers used 30,647,800 cubic feet, an increase of 1,311,900 feet over 1909-10, or 4·4 per cent. Slot-meter consumers accounted for 5,075,600 cubic feet, an increase of 770,000 feet, or 18 per cent. Then 5,753,400 cubic feet was estimated to have been consumed by the public lamps. The annual consumption of gas per slot-meter consumer averaged 10,995 cubic feet. The capital indebtedness of the department now amounted to £15,059. Mr. French, to correct misleading statements, showed that in 1903 there was a deficit on the revenue account of the department of £1283. This had been extinguished, and a credit balance established of £3352. During the past ten years, the price of gas had been reduced by 1s. 6d. per 1000 cubic feet, and the public lighting charges by £460 a year, or nearly 3d. in the pound on the general district rate. It reflected great credit on the Manager, who had brought his department back to such a satisfactory position. Mr. Wheatley hoped that before long the Council would be able to show their appreciation of the Manager's services. The Gas Committee's recommendation that the price of gas be reduced to 3s. 1d. per 1000 cubic feet, and that the charge to slot-meter consumers be lowered proportionately, was agreed to.

**Keswick Gas Company.**—The report adopted at the annual meeting of the Keswick Gas Company stated that, after allowing for depreciation of cookers and bad debts, the revenue account showed a balance to credit of £1414 on the working of the year to June 30. The sum available for dividend was £1283. Mr. J. Hepworth, the Consulting Engineer to the Company, in the course of some interesting comparisons, pointed out that in the summer—which was their heavy period—they were now making more than six times the quantity of gas they produced 25 years ago. He paid a tribute to the efficiency of the work of the Manager (Mr. T. Heywood). Dividends were declared at the rate of 10 per cent. per annum on the original capital and 7 per cent. on the additional capital.

## Harrogate Gas Company.

At the half-yearly meeting of the Harrogate Gas Company, Mr. F. Barber, who presided, pointed out that there were no audited accounts for the six months to June 30; but it had always been the custom to give some particulars of the half-year's working, based on tentative accounts prepared by the General Manager (Mr. H. Wilkinson). According to these, he was glad to say that, as compared with the corresponding period of 1910, the result of the working of the first half of the present year had been entirely satisfactory, as they were £1192 better than was the case at the same time last year. This was due to a steady increase in the sale of gas, and an improvement in the price of residuals, on the top of good working results. Last year they were face to face with serious litigation with the contractors who carried out the light railway works. They had refused to accept the final certificate of the Engineer, and made a claim upon the Company for a large amount. At the special request of the Board, the Chairman undertook the conduct of the matter; but notwithstanding every effort on his part, in the course of which a substantial offer of compromise was made, the Company were ultimately served with a writ. As the contracts for the work provided that all disputes were to be settled by the Engineer, application was made to the Court to stay the proceedings. Master Chitty, however, refused to grant a stay; and the Company appealed to Mr. Justice Horridge, who ordered the action to be stayed, subject to the costs of the proceedings being costs in the arbitration. The contractors then appealed to the Court of Appeal, who upheld the decision of Mr. Justice Horridge. Being left to their remedy by arbitration, the contractors ultimately gave notice to the Company of their intention not to avail themselves of that course; and the matter might be regarded as at an end, except with regard to the payment by the contractors of the costs of the proceedings in the action, which had not yet been dealt with. The usual interim dividends were declared; and a vote of thanks was passed to the Chairman, Directors, officials, and staff.

**Brisbane Gas Company.**—The revenue of the Brisbane Gas Company from the sale of gas, &c., during the six months to June 30 was £31,015; and there was a balance brought forward of £7729, making a total of £38,744. The expenditure on gas manufacture, &c., was £20,322; and £7000 was placed to the reserve fund. The net amount to the credit of the profit and loss account was thus £11,422, out of which the Directors recommended a dividend of 6 per cent., which, with income-tax, would absorb £10,215, and leave a sum of £1207 to be carried forward. During the half year many extensions of mains were made. A strike of gas workers, arising from a dispute with which the Company were in no way connected, took place towards the end of May. A number of the Company's employees struck work in sympathy, with the result that the public and the Company suffered much inconvenience and loss; and the work of extensions was somewhat delayed.


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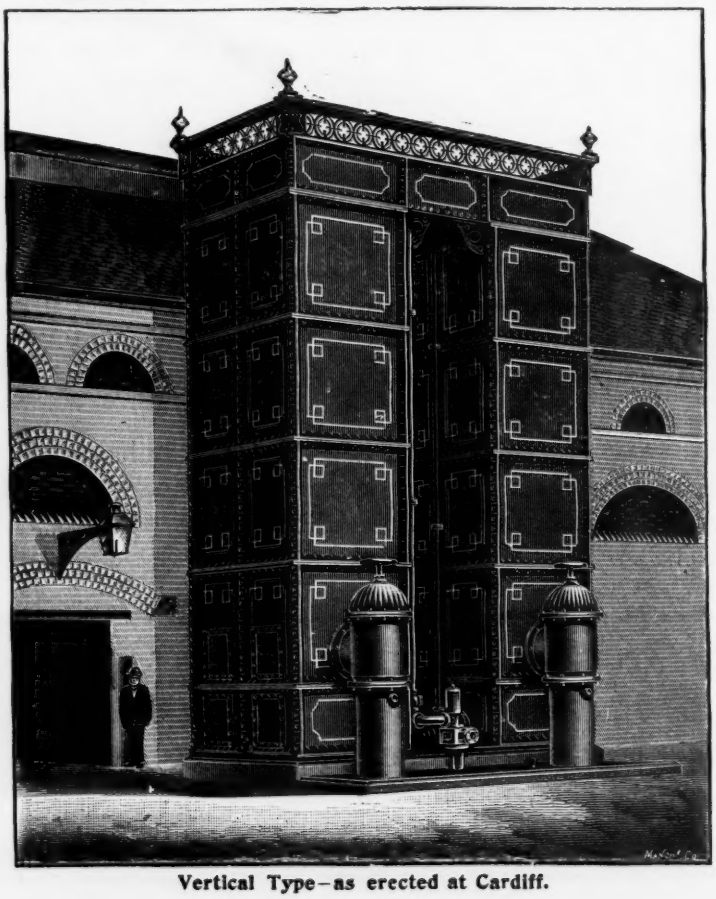

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## Unlawful Use of Water.

At the Aldershot Police Court, last Thursday, Thomas Crowther was summoned by the Aldershot Gas and Water Company for using water other than for domestic purposes. Mr. Norman Clinton, who prosecuted, described the case as an unusual one. An Inspector of the Company found there was running water on defendant's premises; and on making an examination of the cistern at the back of the house, he discovered a pipe fixed to the waste-pipe which was there to catch any overflow. The pipe first mentioned ran to a fish-tank outside defendant's premises, in which were fish swimming about. By the slightest manipulation, said Mr. Clinton, either by pressure on the ball-cock or by a little bending of the arm to the ball, there was actually continually running water; so that there was a constant stream of water keeping the fish-tank in splendid condition. It was a very excellent and ingenious arrangement; and if everybody adopted the same principle, the amount of water wasted in Aldershot alone would be something enormous. Mr. Allen, an Inspector in the employ of the Company, said a tube was suspended from the overflow-pipe, and the overflow water dropped into a funnel tied to the end of the pipe. The galvanized tank into which the water ran would contain about 80 gallons of water. At one end of the tank was a piece of perforated zinc, which would be sufficient to allow the water to pass through the tank. The only supply to the tank was from the overflow-pipe. The owner of the house only paid for water for domestic purposes. Defendant explained that the overflow used to run on to some cement he kept at the back of his house; and to prevent this, he put something to catch the overflow. The Magistrates inflicted a fine of 10s., with 11s. costs.

**Reduction in Price at Bideford.**—The Directors of the Bideford Gas and Coke Company have reduced the price of gas to 2s. 8d. per 1000 cubic feet, subject to discounts as previously allowed. This price is to take effect from March 31 last.

**Gosberton Gas Company to be Wound Up.**—At a meeting last week of the shareholders of the Gosberton (South Lincolnshire) Gas Company, it was resolved voluntarily to wind up the Company; Mr. Bryan Smith being appointed Liquidator. It is reported that the Company's property is shortly to come under the hammer.

**Rochdale Gas-Workers' Wages.**—The Rochdale Gas Committee have received a letter from the Gas Workers' Union asking for an advance of wages for stokers, firemen, still men, yard men, general labourers, and lamplighters. The application was referred to the Works Sub-Committee for consideration, so that they might report to the next meeting of the Committee.

**Further Strike Threats at Douglas.**—Two months ago, the Directors of the Douglas Gas Company granted their stokers an advance in wages from 4s. 6d. to 5s. per eight-hour shift; but it is reported that they have now been asked to revert to the old scale of wages during the winter months. They have, however, threatened to cease work unless the new rate of pay is maintained; and in this step they will receive the support of the other employees.

**Ottoman Gas Company.**—The Directors' report for the half year ended June 30, to be presented at the ordinary general meeting on the 19th inst., states that the gas rental amounted to £20,929 (for the corresponding half year it was £18,608). The net profit was £4598; while for the first six months of 1910 it was £4206. The amount standing at the credit of the profit and loss account is £12,534; and the Directors recommend the payment of a dividend at the rate of 7 per cent. per annum on the preference shares (less income-tax) and at the rate of 8 per cent. per annum on the ordinary shares (tax free), leaving a balance of £9639 to be carried forward.

**Gas v. Electricity at Lewes.**—One of the recommendations made to the Lewes Town Council last Wednesday by the Highways and Works Committee, was that the tender of the Electric Supply Company, Limited, for lighting 127 lamps be accepted, and that the necessary notice be given to the Gas Company terminating the existing arrangements with respect to these lamps. Mr. Verral moved an amendment deleting the minute; arguing that the Gas Company were ratepayers to the extent of £500, while the Electric Light Company only paid one-fifth as much. The shareholders in the former were Lewes people; while the latter were a Company from London or elsewhere. Mr. Savage said the estimate of the Gas Company was about £90 less than what they had previously paid; so that their conscience was pricking them somewhere. But the estimate of the Electric Light Company was £40 to £50 less still. Mr. Lloyd thought gas was the best illuminant for outdoor lighting. Ultimately an amendment to refer the matter back for further consideration was carried by ten votes to six.

## APPLICATIONS FOR LETTERS PATENT.

19,156.—Sutherland, J. G. & A. G., "Gas governors or regulators." Aug. 26.
19,207.—Thompson, W. P., "Gaslamp." A communication from the General Gaslight Company. Aug. 28.
19,255.—Keith, J. & G., "Incandescent gas-lamps." Aug. 28.
19,299.—Amphlett, H.P., "Centrifugal governors." Aug. 29.
19,300.—Price, H. S., "Universal joint." Aug. 29.
19,330.—Rigby, T., and Testrup, N., "Wet carbonizing of peat." Aug. 29.
19,369-70.—Julius Pintsch Akt.-Ges., "Apparatus for giving intermittent flashes of light. Aug. 30.
19,372.—Kopper, H., "Regenerative gas-furnaces." Aug. 30. [Addition to 30,294/09.]
19,420.—Helps, G., "Gas-burners." Aug. 31.
19,423.—Helps, G., "Gas-lamps." Aug. 31.
19,536.—Maerz, J., "Regenerative furnaces." Sept. 1.
19,555.—Waddell, A., "Withdrawal of coke from vertical retorts." Sept. 2.
19,559.—Alexander, H. G., "Petrol gas." Sept. 2.


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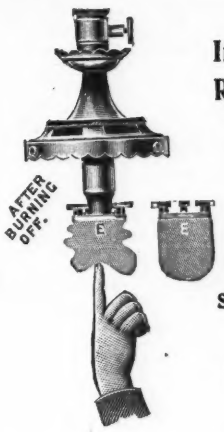


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**Price of Gas at Radcliffe.**—The Directors of the Radcliffe and Pilkington Gas Company announce a reduction of 1d. per 1000 cubic feet in the price of gas. The price will then be 2s. 9d. The reduction starts next month. Large users and prepayment consumers are also to have concessions. This is the third reduction in three years.

**Completion of the Lincoln Water Scheme.**—The new water scheme at Lincoln is now nearing completion; and it has been definitely arranged that on the 4th prox. the water is to be turned on for the regular use of the citizens. The Council want the whole country to know, says the Lord Mayor, that the reproach which at one time rested upon Lincoln has at last been removed, and that they have now a water supply second to none in the kingdom.

**Co-Partnership at Watford.**—The second annual balance-sheet and report of the co-partnership fund of the Watford Gas Company, which will be presented at the general meeting of the co-partners on the 29th inst., states that the bonus and interest for the year to June 30 divided among the members of the fund amounted to the very substantial sum of £502. The Trustees have been enabled to purchase £880 of the Company's "B" Stock since the commencement of the fund. Of this amount, £470 has been alloted to 47 of the co-partners; leaving a balance of £410. This, with any stock they may be able to purchase, will be divided among the co-partners eligible to receive stock. The sum of £59 has been paid to the members on account of illness, or because of employees leaving the Company's service.

The Middleton Corporation Gas Committee have decided that application be made to the Local Government Board for sanction to borrow £1800, to be spent on mains and meters; and the Town Council have approved of the same.

The "London Gazette" for the 1st inst. contains a winding-up notice in respect of the Merlin Gas and Engineering Company, Limited, of Manchester—possibly with a view to re-construction, as the previous day (Aug. 31) a new company with the title of "Merlin Light, Limited," was registering with a capital of £5000 in £1 shares.

The minutes of the Gas Committee confirmed at last week's meeting of the Huddersfield Town Council contained an account of an inspection of the gas-works by the members of the Committee under the guidance of the Gas Engineer (Mr. E. A. Harman), who described to them the system adopted for the making of gas. "The Committee were impressed," the record set out, "by the orderly manner in which the works were kept, and expressed their admiration at the efficient working of the same. They inspected the work in progress in connection with the installation of the new middle bench of retorts, which the Engineer stated would be ready for working during the winter months. They also inspected the offices, which are to be enlarged; and at the conclusion of the visit, a vote of thanks was accorded Mr. Harman for his services in conducting the party over the works and the detailed explanations given by him of the plant and working of the different departments."

## TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Sept. 9. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

| Article. | Basis. | London. | North-East Coast. | East Coast, Yorks. | West Coast. | | Glasgow. |
|---|---|---|---|---|---|---|---|
| | | | | | Liverpool. | Manchester. | |
| Tar, crude | per ton | — | 20/- 25/- | 21/- 25/- | — | 21/- 24/- | — |
| Pitch | „ | 42/6 | 40/- | 40/- | 40/- | 39/6 | 39/6 |
| Benzol, 90% | per gallon | 1/- | -/9½ -/10 | -/9½ | -/9¼ | -/9¼ -/9½ | -/9¾ |
| Benzol, 50-90% | „ | — | -/10 | -/9 | — | -/9 | — |
| Toluol, 90% | „ | — | -/10 | -/9 | -/10 | -/10 | -/10 |
| Crude naphtha, 30% | „ | — | -/4¼ | -/3⅝ | -/3¾ | -/3⅝ | — |
| Light oil, 50% | „ | — | -/3½ | -/3½ -/3¾ | -/3½ | -/3½ | — |
| Solvent naphtha, 90-160 | „ | — | -/10 -/10½ | -/10 | -/10 | -/10 | -/11 |
| Heavy naphtha, 90-190 | „ | — | -/11 | -/11 | -/11¼ | -/11½ -/11½ | -/11 |
| Creosote in bulk | „ | -/2¾ | -/2 1/16 | -/2⅛ | -/2⅛ | -/2 3/16 | -/1⅞ |
| Heavy oils | „ | — | -/2½ -/2⅝ | -/2¼ | -/2¾ | -/2¾ | -/2⅝ |
| Carbolic acid, 60's | „ | 2/4 | 2/2 | 2/3 | — | — | 2/3 |
| Naphthalene, crude drained salts | per ton | — | 43/9 | 42/6 | 47/6 | 47/6 50/- | — |
| „ pressed | „ | — | 60/- | 63/- | 60/- | 60/- 72/6 | — |
| „ whizzed | „ | — | — | — | 70/- 72/6 | 65/- 75/- | 62/6 |
| Anthracene | per unit | -/2 | -/1½ | -/1½ | -/1¼ | -/1¼ | — |

## GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 644.

| Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. | Issue. | Share. | When ex-Dividend. | Dividend or Dividend & Bonus. | NAME. | Closing Prices. | Rise or Fall in Wk. | Yield upon Investment. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| £ | | | p.c. | | | | £ s. d. | £ | | | p.c. | | | | £ s. d. |
| 1,551,868 | Stk. | Apl. 12 | 5 | Alliance & Dublin Ord. | 81—84 | .. | 5 19 1 | 200,242 | Stk. | Aug. 31 | 6 | Lea Bridge Ord. 5 p.c. . | 118—120* | .. | 5 0 0 |
| 374,000 | Stk. | July 14 | 4 | Do. 4 p.c. Deb. | 93—95 | .. | 4 4 3 | 561,000 | Stk. | Aug. 16 | 10 | Liverpool United A. . | 210—212 | .. | 4 14 4 |
| 250,000 | 5 | May 12 | 7 | Bombay, Ltd. . . . | 6½—6⅝ | .. | 5 3 8 | 718,100 | „ | „ | 7 | Do. B. . | 161½—163½ | .. | 4 5 8 |
| 50,000 | 10 | Aug. 31 | 15 | Bourne- ) 10 p.c. . . | 28½—29½* | .. | 5 1 8 | 306,083 | „ | June 30 | 4 | Do. Deb. Stk. | 102—104 | .. | 3 16 11 |
| 311,810 | 10 | „ | 7 | mouth Gas ) B 7 p.c. . | 16½—16¾* | .. | 4 3 7 | 75,000 | 5 | June 15 | 6 | Malta & Mediterranean | 4⅜—5 | .. | 6 0 0 |
| 75,000 | 10 | „ | 6 | and Water ) Pref. 6 p.c. | 14¼—14½* | .. | 4 1 4 | 560,000 | 100 | Apl. 1 | 5 | Met. of ) 5 p.c. Deb. | 101—103 | .. | 4 17 1 |
| 380,000 | Stk. | Aug. 16 | 13 | Brentford Consolidated | 256—261 | .. | 4 19 7 | 250,000 | 100 | „ | 4½ | Melbourne ) 4½ p.c. Deb. | 101—103 | .. | 4 7 5 |
| 330,000 | „ | „ | 10 | Do. New . . . | 198—203 | .. | 4 18 6 | 541,920 | 20 | May 31 | 3½ | Monte Video, Ltd. . . | 12⅜—13½ | .. | 5 5 8 |
| 50,000 | „ | „ | 5 | Do. 5 p.c. Pref. . | 120—122 | .. | 4 2 0 | 1,775,892 | Stk. | July 28 | 4½ | Newc'tle&G'tesh'd Con. | 103—105 | .. | 4 3 4 |
| 206,250 | „ | June 15 | 4 | Do. 4 p.c. Deb. . | 97—99 | .. | 4 0 10 | 529,705 | Stk. | June 30 | 3½ | Do. 3½ p.c. Deb. | 87—89 | .. | 3 18 8 |
| 220,000 | Stk. | Aug. 31 | 11 | Brighton & Hove Orig. | 216—221* | .. | 4 19 7 | 55,940 | 10 | Aug. 31 | 7/7/0 | North Middlesex 7 p.c. | 14⅜—15⅛* | .. | 4 10 4 |
| 246,320 | „ | „ | 8 | Do. A Ord. Stk. . | 156—159* | .. | 5 0 8 | 300,000 | Stk. | Apl. 27 | 8 | Oriental, Ltd. . . . | 138—140 | .. | 5 14 4 |
| 490,000 | 20 | Apl. 12 | 12½† | British . . . . . | 46—47 | +1 | 5 6 5 | 60,000 | 5 | Apl. 12 | 8 | Ottoman, Ltd. . . . | 6¾—7⅛ | .. | 5 10 4 |
| 120,000 | Stk. | June 30 | 4 | Do. 4 p.c. Deb. Stk. | 94—96 | .. | 4 3 4 | 31,800 | 53 | Aug. 16 | 13 | Portsea Island A . . | 133—136 | .. | 5 1 0 |
| 109,000 | „ | Aug. 16 | 6 | Bromley, A 5 p.c. . . | 115—120 | .. | 5 0 0 | 60,000 | 50 | „ | 13 | Do. B . . | 122—125 | .. | 5 4 0 |
| 165,700 | „ | „ | 4½ | Do. B 3½ p.c. . . | 85—90 | .. | 5 0 0 | 100,000 | 50 | „ | 12 | Do. C . . | 117—122 | .. | 4 18 4 |
| 82,278 | „ | „ | 5½ | Do. C 5 p.c. . . | 105—110 | .. | 5 0 0 | 398,490 | 5 | May 31 | 8 | Primitiva Ord. . . . | 7¼—7½ | .. | 5 6 8 |
| 55,000 | „ | June 30 | 3½ | Do. 3½ p.c. Deb. . | 82—84 | .. | 4 3 4 | 796,980 | 5 | June 30 | 5 | Do. 5 p.c. Pref. . | 5¼—5½ | .. | 4 10 11 |
| 250,000 | Stk. | „ | 4 | Buenos Ayres 4 p.c. Deb. | 95—97 | .. | 4 2 6 | 488,900 | 100 | June 1 | 4 | Do. 4 p.c. Deb. . | 97—99 | .. | 4 0 10 |
| 100,000 | 10 | — | — | Cape Town & Dis., Ltd. | 2—3 | .. | — | 312,650 | Stk. | June 30 | 4 | River Plate 4 p.c. Deb. | 95—97 | .. | 4 2 6 |
| 100,000 | 10 | — | — | Do. 4½ p.c. Pref. . | 4—5 | .. | — | 250,000 | 10 | Mar. 24 | 9 | San Paulo, Ltd. . . . | 21⅛—22⅛ | .. | 4 0 0 |
| 100,000 | Stk. | June 30 | 4½ | Do. 4½ p.c. Deb. Stk. | 80—83 | .. | 5 8 5 | 115,000 | 10 | „ | 6 | Do. 6 p.c. Pref. . | 12—12⅛ | .. | 4 16 0 |
| 157,150 | Stk. | Aug. 16 | 5 | Chester 5 p.c. Ord. . . | 107—109 | .. | 4 11 9 | 125,000 | 50 | July 1 | 5 | Do. 5 p.c. Deb. . | 50—51 | +⅛ | 4 18 0 |
| 1,513,280 | Stk. | „ | 5/9/4 | Commercial 4 p.c. Stk. | 111½—113½ | .. | 4 16 1 | 135,000 | Stk. | Aug. 31 | 10 | Sheffield A . . . . | 234—236* | .. | 4 4 9 |
| 560,000 | „ | „ | 5½ | Do. 3½ p.c. do. . | 105½—107½ | .. | 4 19 3 | 209,984 | „ | „ | 10 | Do. B . . . . | 233—235* | .. | 4 5 1 |
| 475,000 | „ | June 15 | 3 | Do. 3 p.c. Deb. Stk. | 76—78 | .. | 3 16 11 | 523,500 | „ | „ | 10 | Do. C . . . . | 233—235* | .. | 4 5 1 |
| 800,000 | Stk. | May 31 | 4 | Continental Union, Ltd. | 88—92 | .. | 4 7 0 | 70,000 | 10 | June 15 | 7 | South African . . . | 8½—9½ | .. | 7 7 4 |
| 200,000 | „ | „ | 7 | Do. 7 p.c. Pref. | 135—137 | .. | 5 2 2 | 6,429,895 | Stk. | Aug. 16 | 5/9/4 | South Met., 4 p.c. Ord. | 116—118 | —½ | 4 12 8 |
| 492,270 | Stk. | — | 5½ | Derby Con. Stk. . . . | 122—124 | .. | 4 8 9 | 1,895,445 | „ | July 14 | 3 | Do. 3 p.c. Deb. | 78½—80½ | .. | 3 14 6 |
| 55,000 | „ | — | 4 | Do. Deb. Stk. . . . | 104—105 | .. | 3 16 2 | 209,820 | Stk. | Aug. 16 | 8½ | South Shields Con. Stk. | 150—152 | .. | 5 11 10 |
| 840,150 | 10 | July 28 | 10 | European, Ltd. . . . | 18½—19½ | .. | 5 2 7 | 605,000 | Stk. | „ | 5¾ | S'th Suburb'n Ord. 5 p.c. | 117½—119½ | .. | 4 14 9 |
| 16,160,600 | Stk. | Aug. 16 | 4/14/8 | Gas- ) 4 p.c. Ord. . . | 106—107 | .. | 4 8 5 | 60,000 | „ | „ | 5 | Do. 5 p.c. Pref. . | 115½—117½ | .. | 4 5 1 |
| 2,600,000 | „ | „ | 3½ | light ) 3½ p.c. max. . | 83—85 | .. | 4 2 4 | 117,058 | „ | July 14 | 5 | Do. 5 p.c. Deb. Stk. | 121—123 | .. | 4 1 4 |
| 4,062,235 | „ | „ | 4 | and ) 4 p.c. Con. Pref. | 101—103 | .. | 3 17 8 | 502,310 | Stk. | May 12 | 5 | Southampton Ord. . . | 108—110 | .. | 4 10 11 |
| 4,531,705 | „ | June 15 | 3 | Coke ) 3 p.c. Con. Deb. | 79—81 | .. | 3 14 1 | 120,000 | Stk. | Aug. 16 | 7½ | Tottenham ) A 5 p.c. . | 145—148 | +1 | 4 16 3 |
| 258,740 | Stk. | Mar. 10 | 5 | Hastings & St. L. 3½ p.c. | 96—98 | .. | 5 2 0 | 483,940 | „ | „ | 5⅝ | and ) B 3½ p.c. . | 114—116 | .. | 4 17 0 |
| 82,500 | „ | „ | 6½ | Do. do. 5 p.c. | — | .. | — | 149,470 | „ | June 15 | 4 | Edmonton ) 4 p.c. Deb. | 96—98 | .. | 4 1 8 |
| 70,000 | 10 | Apl. 27 | 11 | Hongkong & China, Ltd. | 17½—18 | .. | 6 2 2 | 182,380 | 10 | June 15 | 8 | Tuscan, Ltd. . . . . | 8¾—9¼ | .. | 8 13 0 |
| 131,000 | Stk. | Mar. 10 | 7½† | Ilford A and C . . . | 148—152 | .. | 4 18 8 | 149,900 | 10 | July 1 | 5 | Do. 5 p.c. Deb. Red. | 96—98 | .. | 5 2 0 |
| 65,780 | „ | „ | 6† | Do. B . . . . . | 122—125 | +1 | 4 16 0 | 236,476 | Stk. | Aug. 16 | 5 | Tynemouth, 5 p.c. max. | 113—115 | .. | 4 6 11 |
| 65,500 | „ | June 30 | 4 | Do. 4 p.c. Deb. . . . | 94—96 | .. | 4 3 4 | 255,636 | Stk. | Aug. 31 | 6⅞ | Wands- ) B 3½ p.c. . . | 142—145* | .. | 4 14 10 |
| 4,940,000 | Stk. | May 12 | 9 | Imperial Continental . | 180—183 | .. | 4 18 4 | 85,766 | „ | June 30 | 3 | worth ) 3 p.c. Deb. Stk. | 71—73* | .. | 4 2 2 |
| 1,235,000 | Stk. | Aug. 16 | 3½ | Do. 3½ p.c. Deb. Red. | 90—92 | .. | 3 16 1 | | | | | | | | |

Prices marked * are "Ex. div." † Next dividend will be at this rate.

The Doncaster Town Council have agreed to recommendations that £5000 be raised on loan for extra gas-works plant and main extensions, and that application be made to the Local Government Board for permission to borrow £8000 for the extension of water-mains and services in the Corporation's water area.

Consequent upon their rapidly-increasing business operations, the Power-Gas Corporation, Limited, of Stockton-on-Tees, are rearranging their London office staff. They have transferred Mr. J. Whitaker Taylor from the Manchester office to London; and from the office of the Corporation at No. 39, Victoria Street, S.W., he will devote his attention to the still further extension of the interests of the Corporation and its clients.

The accounts of the Bland Light Syndicate, Limited, for the year ending April 30 last were submitted at the annual general meeting of shareholders on the 31st ult., when the Chairman (Mr. C. W. Bland) congratulated them on the results of the year's trading. An interim dividend at the rate of 10 per cent. per annum for the six months ending Oct. 31, 1910, was paid in June; and the Directors recommended a further distribution at the rate of 20 per cent. per annum—making a dividend of 15 per cent. for the year, with a substantial carry-forward. He said that the continuous expansion of the Company's business was being well maintained; and the further increase anticipated in last year's report had been fully realized. In the meantime returns this year showed considerable improvement over last year.

## WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

**Appointments Vacant.**

SECOND ASSISTANT (Gas Department), Singapore Municipal Commissioners. Applications by Sept. 15.
GAS ENGINEER (as Representative). No. 5441.
MANAGER AND SECRETARY. Longridge Gas Company.
REPRESENTATIVE. No. 5442.
GAS STOKERS. Longwood Gas Company.

**Patent Licenses, &c.**

"IMPROVEMENTS IN METERS." Haseltine, Lake, and Co., Southampton Buildings, Chancery Lane, W.C.

**Plant, &c. (Second-Hand) Wanted.**

STATION METERS. Box 297, Burton's.

**Meetings.**

BRITISH GASLIGHT COMPANY. London Office. Sept. 27. Twelve o'clock.
OTTOMAN GAS COMPANY. London Office. Sept. 19. One o'clock.

**Stocks and Shares.**

BISHOP'S STORTFORD, HARLOW, AND EPPING GAS AND ELECTRICITY COMPANY. By auction. Sept. 19.
DARTFORD GAS COMPANY. By auction. Oct. 3.
SOUTHEND WATER WORKS COMPANY. By auction. Oct. 3.
WESTON-SUPER-MARE GASLIGHT COMPANY. By auction. Oct. 4.

**TENDERS FOR**

**Coke.**

WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by Sept. 18.

**Livesey Washer.**

GOOLE GAS DEPARTMENT. Tenders by Sept. 27.

**Purifying Plant and House (Alterations, &c.)**

ISLE OF THANET GAS COMPANY. Tenders by Oct. 5.

**Sulphuric Acid.**

MARKET HARBOROUGH GAS-WORKS. Tenders by Sept. 25.

**Tar.**

MARKET HARBOROUGH GAS-WORKS. Tenders by Sept. 25.

## NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

*No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.*

**COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.**

**Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.**

**Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.**

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Resists 4500° Fahr. Best for GAS-WORKS.
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*General Manager (for Scotland)*—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

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(GAS ENGINEER'S DEPARTMENT.)

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Apply to J. H. BREARLEY, Engineer and Manager, Gas Offices, Longwood, HUDDERSFIELD.

ISLE OF THANET GASLIGHT AND COKE COMPANY, MARGATE.

**THE Directors of the above Company** invite TENDERS for carrying out certain ALTERATIONS and ADDITIONS to PURIFYING PLANT and HOUSE, with Foundations, Columns, Concrete Liquor Tank, &c., &c., at their Gas-Works, Margate, to Drawings and Specification prepared for the same by the Company's Engineer and Manager, Mr. J. M. Campbell, from whom any Preliminary Particulars may be obtained on Application.
The Site may be Inspected, and the Drawings and Specification seen and copies taken, at the Gas Company's Office, Margate (by arrangement with the Engineer), on payment of Two Guineas, which amount will be returned on the receipt of a *bonâ-fide* Tender.
Sealed Tenders are to be addressed to the Chairman, endorsed "Tender for Purifiers, &c.," and delivered at the Offices not later than Thursday, Oct. 5, 1911.
The Directors do not bind themselves to accept the lowest or any Tender.
By order,
THOS. C. FULLER,
Secretary.
Offices: Addington Street,
Margate, Sept. 9, 1911.

COKE.

**THE Directors of the Wandsworth** and Putney Gaslight and Coke Company invite TENDERS for the Removal of about 18,000 Tons of Guaranteed "Wandsworth" COKE from their Works at Wandsworth, between Oct. 1 and March 31 next.
The Coke to be removed by Van or by Barge (free Waterway on River Thames).
Sealed Tenders, endorsed "Tender for Coke," to be delivered not later than the 18th of September, 1911.
The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.
Any further Information may be obtained from the Engineer, Mr. H. O. Carr.
CHAS. W. BRAINE,
Secretary.
Wandsworth and Putney Gaslight
and Coke Company, Fairfield Street,
Wandsworth, S.W., Aug. 24, 1911.

MARKET HARBOROUGH URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

SURPLUS TAR AND SULPHURIC ACID.

**TENDERS are invited for the Surplus** TAR produced, and also for the Supply of SULPHURIC ACID required, during the year ending Sept. 30, 1912.
Particulars may be obtained from the undersigned, to whom sealed Tenders, endorsed "Tender for Tar," and "Tender for Sulphuric Acid," respectively, must be delivered not later than noon on Monday the 25th inst.
ALFRED T. HARRIS,
Manager and Secretary.
Gas Offices, Market Harborough,
Sept. 6, 1911.

GOOLE URBAN DISTRICT COUNCIL.

**TENDERS are invited for the Supply** and Fixing of a LIVESEY WASHER at the Gas-Works.
Specification and full Particulars may be obtained on Application to Mr. J. Fazakerley, Gas and Water Engineer, Gas-Works, Goole.
Tenders, endorsed "Tender for Washer," to be received by me not later than Noon on Wednesday, the 27th of September, 1911.
ROBERT TYSON,
Clerk to the Council.
Council Offices, Goole,
Sept. 6, 1911.

**THE Proprietors of Patent No. 19,479** of 1905, for "IMPROVEMENTS IN OR RELATING TO METERS" are desirous of entering into Arrangements, by way of LICENCE and otherwise, on Reasonable Terms, for the purpose of EXPLOITING the same and ensuring its Full Development and Practical Working in this Country.
All Communications should be addressed in the first instance to HASELTINE, LAKE, & Co., Chartered Patent Agents and Consulting Engineers, 7 & 8, Southampton Buildings, Chancery Lane, LONDON, W.C.